Industrial Medicine

for

Physicians and Surgeons in Industry

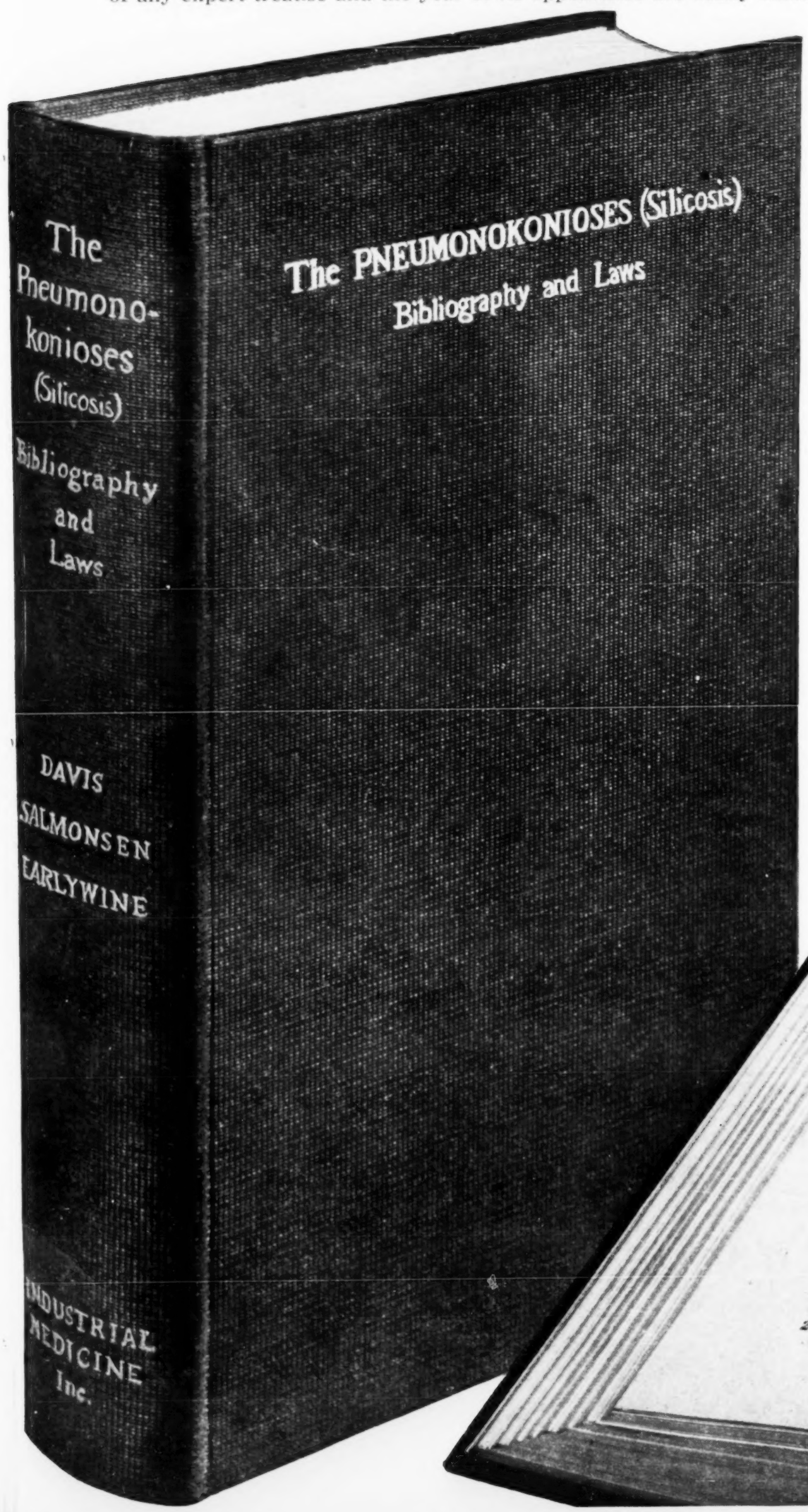
The Pneumonokonioses (Silicosis)

Bibliography *and* Laws Book No. 1

All the References of the World's Literature
--- from 1556 to December 31, 1933 ---

Review from **"Staub"**, (Dust), 1, No. 1:167-168, April, 1936, done by Dr. Ing. O. M. Faber, Berlin.
No. 115. Bibliography and Laws upon Silicosis. **(The Pneumonoconioses (Silicosis) Bibliography and Laws),** by Geo. G. Davis, E. M. Salmonsen and J. L. Earlywine, published by **Industrial Medicine,** Chicago, Ill., 1934, 482 pp. ($7.50).

The **Forword** is by E. R. Le Count, Chief of the Department of Pathology, The University of Chicago. The book has two main divisions. Part I is a Bibliography of the collected literature of the world upon the **Pneumonoconioses (Silicosis).** Beginning with the **De Re Metallica** of Agricola (1556), it ends with 1933, inclusive of 2,768 sources, whose title, author and exact citation are given. The works are chronologically arranged. Through subdivision into different groups, the works of authors appearing in the same year are clearly and immediately perceived. Within the groups the works are still arranged in alphabetical sequence by authors. These 276 pages of comprehensive bibliography are followed by a complete **author—**and **subject—index.** Besides, the location (orientation) of any expert treatise and the year of its appearance are easily made out at a glance.



In Part II, the Laws of the several States of the Union in North America, as relating to Occupational Diseases, the injuries they cause, and any pertinent material, are all represented. The plan and sub-divisions by which the situation can be ascertained for any one of the 48 states of the United States of America, are readily apprehended. In several cases corresponding paragraphs have cross-references. Especially valuable and complete is this legal survey for ascertaining any characteristic verdict (judgment) in respect of a pneumonoconiosis, showing the basis of the action, the conditions giving rise to the action, as well as the principle involved in the decision—for any state in the Union. The book closes with an alphabetical summary of the enterprises concerned in the juridical distinctions (or decisions.)

Examination of the book compels recognition of the extraordinary care and pains taken by the compilers. Random tests here and there show that for a space of 377 years this bibliography has attained a completeness not hitherto arrived at. Probably no branch of any other science has at its disposal so flawless and richly extensive a bibliography. It is authoritative not only for physicians and industrial experts, but also for physicists, engineers, and employers of industry. The format is entirely appropriate; for the arduous work involved the compilers should receive the fullest recognition.

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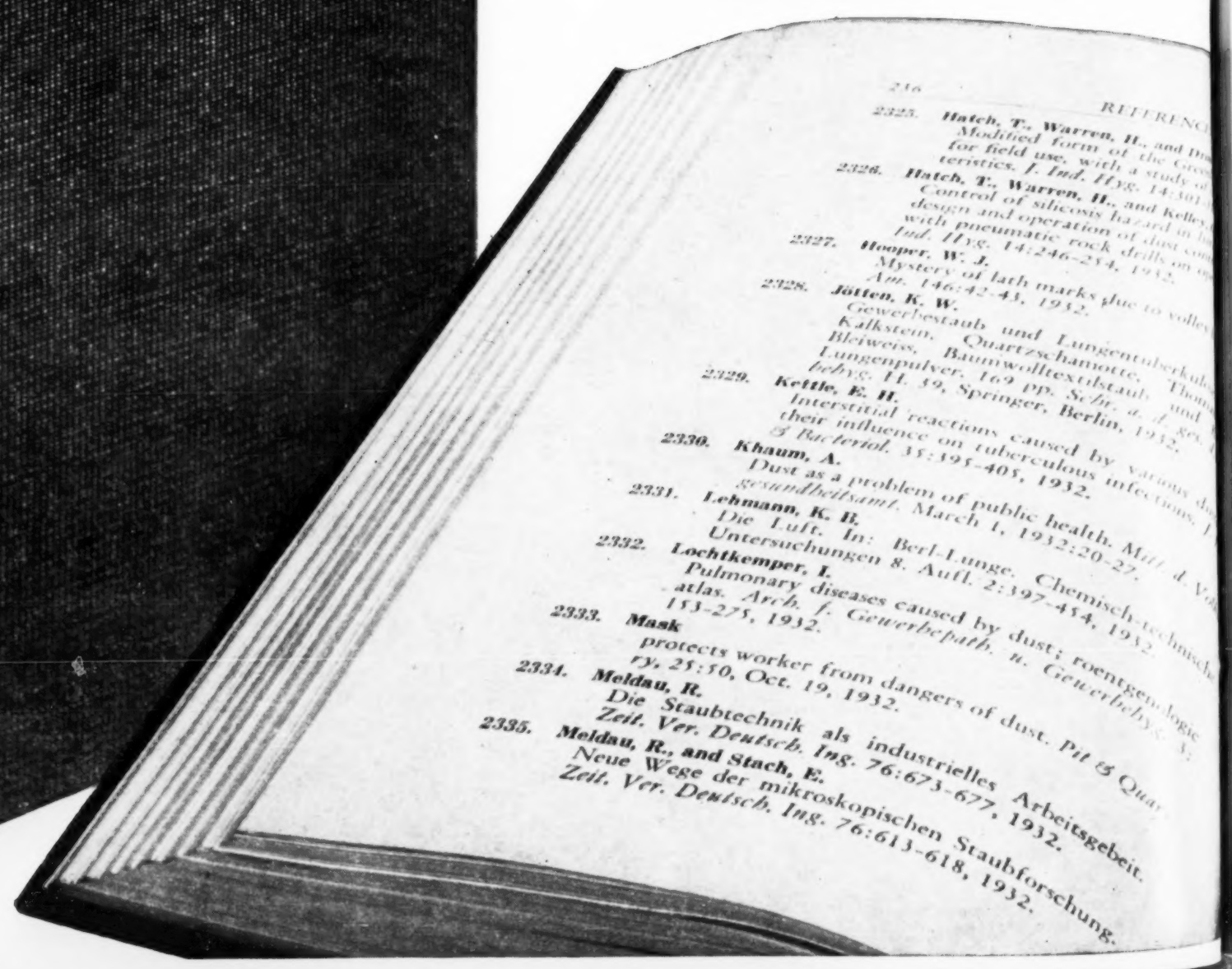
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This magazine is published to promote sound thought upon and concerning industrial medicine and traumatic surgery. To that end it will contain articles, news items, reports, digests and other presentations, together with editors' comments. The editorial policy is to encourage frank discussion. On this basis contributions are invited.

Industrial Medicine

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The editors will exercise care in checking on the accuracy of data printed, but in all other respects articles and opinions of which expression is allowed are the opinions of their authors—the editors reserving in all cases the right to comment on the same, in the current or any subsequent issues, as they may be inclined.

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The Law, the Science and the Economics of Industrial Health

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"Portable" X-Ray Apparatus

—Its Inadequacy in the Radiography of the Chest in Industry for the Detection of Silicosis—

by

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Ottawa, Illinois

IN A previous article[1] recently published it was stated that while careful and exact radiographic technique was not of extremely great importance in the radiography of a broken bone, in radiography of the chest, density, contrast and detail are of the greatest importance, as only with fine detail, sharp outline and contrast of densities can a proper diagnosis be made.

In the past, it is true, many films so pale (underexposed) and lacking in detail that they showed practically nothing but heavy bronchial and hilus densities, and other radiographs so over-exposed that they showed nothing but the diaphragm, the heart and the ribs (all detail of bronchial, hilus and lung shadows being blotted out) have been presented in court, and decisions involving thousands of dollars have been made on such inadequate x-ray evidence.

This state of affairs has been due in large part to the fact that each Roentgenologist, hospital or industrial surgeon had his own ideas about what constituted an adequate film of the chest. It has been shown in a recent survey of sanatoria, hospitals and x-ray laboratories that density, contrast and detail may vary as much as 200% in one hospital as compared with another.[2]

Standardization in chest films has been one of the important needs in radiography, and with a grant in 1929 by the National Tuberculosis Association to the Moore School X-Ray Laboratory of the University of Pennsylvania, surveys and studies were undertaken; and since that time rapid progress has been made in the development of methods for making comparable films that meet definite standards of density, contrast and sharpness. These standards eliminate the useless or worse than useless radiographs that are too light and too dark, and with the adoption of these minimum standards as laid down by the Moore School X-Ray Laboratory and the National Tuberculosis Association, much misleading and inadequate x-ray evidence can, I believe, be thrown out of court.

These minimum standards are in no way a bar to progress toward better apparatus, better x-ray tubes, better films and better diagnosis; but these standards will, without question, eliminate the haphazard, confusing state of affairs that exists at the present time in radiography of the chest. These minimum standards, as recently stated are as follows:[3]

1—Density* within the shadows of the chest as measured with the densitometer (photo-electric cell) must vary between .4 and 1.5 to be perceptible.

2—Films should be examined in a viewing device over which the roentgenogram is mounted with an illumination of 200 to 500 foot-candles.

3—Apparatus with a capacity of less than 100 kilovolts (peak) and 100 milliamperes of current should not be used for chest roentgenography.

4—Apparatus using half-wave rectification is not recommended.

5—Time-temperature method for developing films should be followed carefully—variations in time and temperature from established standards of 65° F and six minutes must be scrupulously avoided.

6—Distance of focal spot of tube to film must be at least four feet and need not be greater than six feet. At a focal spot film distance less than four feet there is a marked non-uniformity of radiation over the surface of the film and gross enlargement and distortion of shadows.

7—Roentgen tube peak voltages should vary between 50 to 80 kilovolts (peak) depending upon the thickness of the chest.

8—The heart and lungs are in constant motion and in order to avoid blurring of shadows (an extremely important factor in diagnosis of silicosis) exposures must be made in 1/10th second or less to "stop" this motion on the film.

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* The roentgenographic density of an area of a finished roentgenogram is defined as the logarithm to the base 10 of the ratio of the intensity of the light incident upon the area to the intensity of the light transmitted by the area. Contrast between two areas of the finished roentgenogram is defined as the difference of the densities of two areas.

9—Tube current should be at least 100 milliamperes. Apparatus furnishing less than this cannot deliver radiographs in a time of 1/10th second or less at a distance of four feet or more.

10—An accurate split-second timer is a necessary part of the equipment.

11—The focal spot of the tube should be the smallest permissible for a given voltage and current. Fineness of detail depends upon the size of the focal spot.

These requirements represent the *minimum*. In order to make x-rays of the chest at the proper exposure—1/10th second or less—at a proper distance—four feet or more—at a proper voltage—50,000 to 80,000 volts, something more than the ordinary so-called "portable" machine is needed.

A machine that will deliver 100 milliamperes of current at 100,000 volts is the *minimum* as far as the size and capacity of the machine is concerned. The average so-called "portable" machine has a far less capacity, and yet I have found a number of industries using these so-called "portable" machines for chest radiography.

A recent advertisement that has come to my desk describes a portable machine as follows: "Superior in power — positively shockproof — very compact. All diagnostic radiography — marvelously simple to operate—for making radiographic diagnosis—in such cases as fracture, foreign bodies, pathology of lungs, heart and stomach, colon, sinus—and fluoroscopy this new model . . . . is easily the outstanding unit in its field. It delivers 20 M.A., at 67 K.V.P. Superior chest negatives can be made in 1/10 to 1/5 second." If such a low-powered machine will take a radiograph of the chest in 1/10 or 1/5 of a second at all, it would be necessary to have the patient almost in contact with the tube. The distortion in such an instance would be enormous and the resultant film diagnostically worthless.

Another manufacturer in his catalog, describing a new shockproof x-ray unit, has a technically beautiful photographic reproduction of a radiograph of the chest. This radiograph, according to the description in the catalog, however, instead of having been made at a minimum of four feet or 48 inches, was taken at 32 inches, and the description in the catalog states that it was on an average-sized patient. As a photograph it is excellent, but as a radiograph, representing the true condition that might very easily exist within the chest (and the purpose of the radiograph, after all, is to present the true conditions that exist in the chest) it is entirely inadequate, because the distance at which the film was made is entirely too short. In fact, such a radiograph from a medicolegal standpoint is worse than useless because it is misleading.

THE National Tuberculosis Association in its published pamphlet, "Diagnostic Standards" of 1935, with regard to radiographs of the chest, states as follows:

"For example, a cavity actually 4 cm. across if situated at the level of the 5th vertebral spine close to the posterior wall of a chest of average depth would be projected 4.8 cm. in diameter at a working distance of 36 inches, 4.5 cm. at 48 inches, and 4.3 cm. at 72 inches. The errors are approximately 20%, 12%, and 7%. This assumes that the cavity is spherical and the film only a few millimeters from the anterior chest wall.

"Of course, the distortion of a sharp-walled cavity can be calculated for any working distance provided the size of the cavity is known. *But with a short working distance, diffusion and distortion even more seriously impair the accurate recording of pulmonary infiltrations, especially those that appear on the film as spots whether scattered or confluent. Diffusion may thus make old, dense, well-circumscribed infiltrations appear ill-demarcated, soft and fresh; while recent and soft infiltration that would appear as light, flocculent spots at an adequate target-film distance, may be almost wiped out or even wholly imperceptible if the working distance is for example, 36 inches and the lesion situated posteriorly.*"

Thus it is seen that with such inadequate equipment it is possible to produce apparently negative radiographs and at the same time have flocculent densities or spots caused by tuberculosis, silicosis or some other cause within the back part of the chest that would not be shown on such a film.

If some attorney representing a petitioner in a suit against an employer could show to the court that radiographs were taken under such conditions, there would not be much question about what the court would do with regard to such radiographs, and yet the salesman representing a certain prominent manufacturer in describing his portable apparatus in a letter to me says nothing about the limitations of such equipment for the taking of x-rays of the chest in industry—and my inquiry to this manufacturer was for specific recommendations for radiographic equipment for this specific purpose. I will quote his letter verbatim.

"I am enclosing with this letter a catalog describing our Stabilized Mobile X-Ray Unit about which we spoke in our telephone conversation today. While this stabilized mobile unit will unquestionably give you the service you want, since you can do satisfactory chests in about ¾ second, depending upon the size of the patient, of course, and using approximately a 40 inch distance, we feel that the Model 'd' Mobile Shock-Proof Unit, a catalog of which we are also enclosing, might be better not only because of the shockproof features which of course, is one of the outstanding features of this unit, but because you can save about 50% in time as compared with the stabilized mobile unit, all other factors of course being equal. We are doing some very fine chest work on the model 'D' in ½ of a second, and in some cases have gone down to ¼th of a second."

I am pointing out these instances not with the idea of condemning any one or two manufacturers, but because, so far as I can determine, this practice is universal, and it is my opinion that this state of affairs has very largely been brought about by the demands for *cheap* equipment rather than *adequate* equipment. At least I know of prominent industries which have purchased such equipment and are using it and are being lulled into a sense of false security by radiographs that, in my opinion, are at least inadequate.

As far as portability of the apparatus is concerned, apparatus of sufficient size and power and speed is required to make radiographs in 1/10 second or less at a distance of at least four feet (preferably six feet), and any industrial plant need not consider portability as a factor. All of these plants have an adequate supply of electrical current to meet any x-ray requirements, and even the heaviest x-ray equipment suitable for radiographs of

the chest can be transported in a one-ton truck.

In order to demonstrate this, recently in making a survey of the employees of the Wedron Silica Company, instead of having these men come to my office at Ottawa, Illinois, as had been customary for a number of years past, I arranged to take the apparatus to the plant. This apparatus has more than ample capacity to meet the minimum requirements as stated above; in fact, instead of taking radiographs at 100 milliamperes and in 1/10th second I am in the habit of taking them at 200 milliamperes and 1/20th second. With the assistance of an adequately trained electrician and physicist, the apparatus was disconnected in my laboratory, loaded into the company's truck, taken to the plant eight miles away, set up, and all the employees—something over 50—were radiographed in less than two hours.

Much has also been said recently about special apparatus and special arrangements for the speeding up of radiographs in large industrial groups. Such special apparatus and special methods, even in large industrial groups, are unnecessary. In radiographing over 2000 employees of the Libbey-Owens-Ford Glass Company I have frequently made 60 exposures in an hour.

This means that if it were necessary 500 employees in an industrial plant could be radiographed in less than two working days.

The time required is not in making the exposures but in processing the films and making adequate examinations of the films afterward.

I feel that I can state positively that these minimum standards of apparatus and technique can be used in practically any industrial plant without any special apparatus or preparation, either single films or stereoscopic pairs, and that such radiographs made at proper speed and distance will stand up in court. High-grade x-ray examinations of the chest can be made on the ground without unnecessarily disturbing the employees, and the work can be done rapidly and efficiently with ordinary high-grade apparatus.

X-Ray apparatus of more than ample power (350 M. A. at 100 K. V.) capable of making radiographs in 1/20th second at six feet, disconnected from cables and supply lines in laboratory and transported to Wedron Silica Company, eight miles distant, and set up in plant for radiographing employees. More than 50 employees were radiographed in less than two hours. The apparatus was transported in a small truck.

References:

(1) *Indust. Med.*, June 1936, pp. 315-318.

(2) WEYL, WARREN and O'NEILL, *Am. J. Roent.*, Vol. 35, p. 527, 1936.

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Work Dull?

NOTHING is more amusing than the belated discovery of big employers of labour that people who work at dull jobs are human beings, and not parts of the machinery.* Books with pretentious titles are being written to prove that happy people do better work than unhappy people, and in order to take the workers' minds off their uninteresting tasks music is played to them, sunbaths are provided, good books are circulated. . . . The old handcraftsman loved his work, and was proud of it. If he found it tedious on a fine day, he amused himself by singing a song. He did not have to be amused by somebody else.

* *Labour Management*, July, 1936; quoting *Daily Express*, June 3, 1936.

Degenerative Diseases

Their Relation to Railway Efficiency

By WILLIAM K. VANCE, M.D.,
Bristol, Tennessee

IN SELECTING this subject, "The Relation of Degenerative Diseases to Railway Efficiency," I thought possibly an appology might be in order for introducing a purely medical subject before a surgical group; but as degenerative diseases, or those disorders characterized by hypertension, organic cardiac arrythmias, angina pectoris, coronary thrombosis, weakness of the heart muscle, arteriosclerosis and sclerosis of the kidney, are so common, and are met daily by those practicing both medicine and surgery, I then decided that I was not much out of order after all.*

We have discussed and collaborated at great length, and with much seriousness, and with great wisdom, but despite all our efforts to unravel the mysteries of this progressive train of symptoms, we are still at a loss to know what causes degenerative diseases and, therefore, we have no receipt for their prevention. Those who use neither alcoholic beverages nor tobacco emphatically state that the use of these commodities causes a person to deteriorate more rapidly. The biological chemist then comes along and says that he finds no evidence to support the theory that whisky or tobacco plays any part in the causation of arteriosclerosis, nephritis or myocarditis. While the argument goes on, both the non-users and the users succumb to the malady in about equal proportions. The thermocouple apparently shows that the use of tobacco in both users and non-users produces a peripheral vaso-constriction with a reduction of surface temperature which constriction, if persisted in, might produce some permanent damage to the arterial wall causing a sclerosis and an increased peripheral resistance with a resulting hypertension. The mechanism of the production of arteriosclerosis has been explained to the satisfaction of some, but in those cases of malignant hypertension where there is no demonstrable local or systemic pathology in the blood vessels or kidney, the mechanical explanation of hypertension is hard to accept.

It is difficult to determine whether the kidney involvement is only a part of the sclerosing process, or is primary and the arteriosclerosis then results from the stretching of arteries with resulting sclerosis. The layman, and sometimes his medical adviser, attaches great importance to a rise in blood pressure, when that increase may be compensatory and may be useful in making up for the loss of glomerular filtering surface.

We frequently see cases which have led an exemplary life and have never used any of the above mentioned poisons, have always lived moderately but well and have not apparently eaten to excess, and in a routine examination, to our surprise, discover that they have considerable hypertension. We run across families in which nearly every member exemplifies this premature degeneration and deterioration, and we explain it by saying that they have inherited poor tubing and vascular material. That statement does not explain anything to an inquiring mind, and when we ask "why", the answer is lost in conversation. We occasionally see several albino children in the same family with deficient pigmentation in the iris, hair, skin and deficient mentality associated with a malignant hypertension and wonder whether the hypertension is also an inherited deficiency of that hypothetical substance, which by its specific action overcomes or neutralizes that substance in the blood which maintains normal arterial tension.

Aschheim, Zondek, Novak and others have worked out in an understandable manner some of the mysteries of the internal secretions of the female, but, so far, man has been left largely alone to work out his own salvation. As man and woman are of the same biological species and are governed by the same laws of nature except for the activities of their specific internal secretions, could not some of the hypertensions coming on in men about the mid-periods of life be due to disorders of internal secretions the same in the male as in the female? I firmly believe that some enthusiastic biological chemist, who would painstakingly study degenerative diseases with the thoroughness that characterized the work on insulin, could add materially to our knowledge of these disorders, and it might be possible to discover the specific toxin or toxines causing this group of symptoms. I am inclined to believe that the etiological factor in hypertension is either the production of normal or abnormal waste products by the host, the slow absorption and slower elimination of normal metabolic products or some abnormality in the endocrine system. May the world soon give us a man who can isolate and measure these normal and abnormal metabolic and toxic products.

We, as physicians, are supposed to advise our patients how to live so that they may round out a long useful life without premature degeneration, but the fact that our profession stands high in furnishing mortality statistics in cardiac and arterial accidents makes us realize that the secrets of longevity are almost as obscure now as in the days of Ponce de Leon. William Mayo says that coronary disease is an increasing factor in the death rate among physicians, surgeons and other professional men, explainable on the theory of high-tension living and sedentary life. As the causes are obscure and many cases are well developed at the time of our first examination, our only hope is in delaying, by sensible advice and the use of a few properly selected drugs, the progress of the disorder. The obscure and latent pathology of the myocardium and coronary arteries is so difficult in detection by ordinary office examination methods of the average physician, that until more simple and less expensive apparatus is discovered for their detection, many cases will still go unrecognized at the time that something might be done for their comfort and prolongation of life. When you examine a patient in your office and find nothing especially wrong, and upon his arrival home you are summoned to see him, and upon your arrival you find him lying dead on the floor, you have to assume that you were either too dumb to know his true condition or that ordinary methods of accurate diagnosis are markedly inadequate and primitive.

THERE is no vocation where responsibility for the protection and preservation of human life is as great as in modern railroading. No man who rides a modern railway train can help but marvel

* Presented at the Thirty-Ninth Annual Meeting of the Association of Surgeons of the Southern Railway System, Knoxville, Tenn., June 16-18, 1936.

at the wonderful coordination of all forces that contribute to his safe, speedy and pleasant travel; but there are too many accidents on the railroads of the United States. In 1912, the accidental death rate of locomotive engineers was 318 per 100,000, and in 1922 it dropped to 167, and by more efficient safety devices and education the accidental death rate has been further reduced to the point where it is no greater than in other vocations. From 1912 to 1922 deaths from organic heart disease in the operating branch of American railroads increased 74% while there was a decrease of 9% in the same age groups of males otherwise employed. Deaths from cerebral hemorrhage and apoplexy in this same railroad group increased 11.4% whereas it reduced 2.2% in the group employed in other vocations. In these years diabetes was decidedly more prevalent in railway employees, than in the civilian population not likewise employed. While no accurate statistics have been compiled recently on railway employees, we are entitled to assume that degenerative diseases have increased in that group the same as in all other groups.

Operation and maintenance of railroads is naturally a hazardous occupation and every employee should enjoy reasonably good health or certainly should not have an advanced stage of any degenerative disease. Upon employment his true physical condition is known, but never afterward, due to lack of periodic physical check-up. Every railroad in the south, and probably in the country, has employees who are holding their positions by seniority instead of physical and mental efficiency, and only a casual inspection discloses the fact that they are a liability to the company, a hazard to themselves and a menace to those whose safety is intrusted to them. Only last week I was called to see a conductor, who came in off his run that morning, apparently in good health, and upon my arrival I found him dead from an angina. Suppose he were in front of a moving train or standing in the open vestibule of a coach at the time of his attack, then his death would have been listed as accidental and the company would have been forced to compensate his widow. In case he had been an engineer and his engine got out of control with a dead man at the throttle, as happened on the Norfolk & Western a few years ago, the potential damage is incomputable. In all railroad shops there are decrepit, worn out, physically unfit men operating power machines where a vertigo or a minor misstep would catapult them to their deaths or permanent injury, to the expense of their employer.

Physical impairment contributes to bad judgment, inefficiency, lack of production and to physical hazard and injury, not only to the employee but also to the traveling public. How can this condition be corrected? The union has stenuously opposed periodic physical check-ups and many of the employees refuse physical examinations, unless compulsory, for fear of disqualification. The union has insisted on a railway employee's retention on account of his seniority rather than physical and mental efficiency.

If the railroads would have a new employee sign an agreement or contract at the time of employment and before he is eligible for union membership, in which he agrees to comply with the rules of the company and have one of those rules state that every employee agreed to have a complete physical examination by the company physician every three to five years or oftener, if deemed advisable by the company, the next few years would show a great improvement in the health and efficiency of the average railway employee, and accidents would be materially reduced. If and when any pension law is passed that affects the Southern Railway there will be over 7,000 employees retired and an equal number of new men will be employed under this new status, and the number will rapidly grow.

These physically unfit and senile cast-off employees must be cared for, which introduces the question of railway pensions. Anyone receiving benefits from any fund should be a contributor to that fund. Some feel that an employer of labor should bear some of the responsibilities of his care after he is "worn out by fair wear and tear in the service." While Federal legislation may authorize railroad pensions, the efficient and impartial and economic application of the law should be vested in a board of railroad men, untrammeled by presidential or legislative coercion, influence or intimidation.

As railway surgeons we should ever be alert for physical defects, independent of the injury we are treating, which might make that employee a potential source of danger to the public and an expensive liability to his employer.

Some of the Evils

That Have Crept into the Medical Profession

By HENRY F. LONG, M.D.,
Statesville, North Carolina

THE first point that I wish to call attention to has been given the polite name of "therapeutic abortion."* Under this excuse or shield, some medical men are doing abortions for all who come, married or single. The unmarried want it done to avoid disgrace and loss of social position. The married women demand it for a variety of reasons: (1) They have "too many children already"; (2) "I want children after awhile, but I want to enjoy a few years of social life first"; (3) For vomiting in pregnancy, or, "I vomited so much when I was pregnant before." I answer these excuses this way: to the unmarried,—go bear your child, cherish it and "sin no more"; to the married—the healthiest women I know, mentally and physically, are those who have borne large families. If women do not bear children the first few years of married life the probability is they nev rewill. The womb becomes atrophic and hard and the ovaries cease to function.

As to vomiting in pregnancy, I regard this as no excuse, provided the woman is isolated and the sympathetic husband and mother kept away from her. Provide her with a quiet sensible nurse, give her a stomach lavage, follow this with a brisk dose of Epsom salts, given through the tube after lavage, institute continuous intravenous drop method of glucose for four or five days, and 99 out of every hundred will completely recover.

I believe that a woman who is illegitimately pregnant and who has made up her mind to conceal her condition, was never known to vomit. This is my personal opinion, and I have found upon investigation that it is an original one. These

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* From President's Address, the Thirty-Ninth Annual Meeting of the Association of Surgeons of the Southern Railway System, Knoxville, Tenn., June 16-18, 1936.

people have not far to go to find relief. I am sorry to state that there are physicians in every town of any size who are doing this criminal work. There are many who are making a regular racket out of it. I know there are a few who are doing it the following way: They give the applicant a regular examination including history, and physical and laboratory tests, and then the patient is told that she has a very bad appendix. The appendix is removed and while she is under anesthesia everything in the uterus is curetted away. They do their own pathological examinations, so the record shows exactly what the inspector of the American College of Surgeons demands. Or these men tell the patient that they have an extremely high blood pressure and that their blood shows a retention of urea, that unless they are aborted at once that they will surely die of uremic poisoning. Again the record shows all that the inspector can ask for. Some of these men stand high in the Medical Synagogue. Ethiopians will not eat eggs, their religion forbids them to devour "that which might have life in the future"; yet doctors who claim to be Christian gentlemen will tear the fetus from the womb of a woman, and not admit that they have committed murder—and for filthy lucre; "the love of money, the root of all evil."

Tonsils

FIFTEEN years ago when tonsils and teeth fell into disrepute, Dr. John McKenzie of Baltimore, Md., a great nose and throat specialist, a teacher with ripe experience, wrote a paper entitled, "The Massacre of the Tonsils." This paper was widely published, but little attention was paid it. The tonsil hunter was busy, and this propaganda spread until all the school children, after an examination by a visiting nurse, must have their tonsils removed. Every child who slept with its mouth open was sentenced, and the mother of the child demanded that the tonsils come out. Every young person who had enlarged tonsils was advised by his or her doctor to have them removed at once. How many — oh, how many, tonsils—have been taken out which were doing good work, the work nature designed them to do!

A child who sleeps with the mouth open needs adenoids removed, not tonsils. Unless tonsils had a pedicle half to an inch long they could not possibly obstruct breathing through the proper channel, the nose. The mouth is not a respiratory organ and is only used as such when the nostrils or post-nasal spaces are occluded. Up to 50 years ago the Amercian Indian was considered the fastest and longest runner of all races. The Indian mother bandaged her child's mouth shut while sleeping, until he was eight years old. The forced passing in of cold air and the passing out of warm air caused an early atrophy of adenoid tissue. All lymphatic tissue begins to atrophy in early adolescence, for this reason a child's appendix is larger than an adult's.

In the collected papers of the Mayo Clinic, for the year 1924, that great surgical philosopher, Dr. Charles Mayo, called attention to the fact that small tonsils were more dangerous than large ones. Small tonsils which are a mass of pin-head abscesses have worn themselves out resisting infection, large tonsils have reacted against infection and thus have become hypertrophic. These tonsils have stood like a breastwork between deadly organisms and the lymphatic channels The small tonsils are a source of great danger causing heart disease, rheumatism, neuritis, etc These tonsils are anatomical cesspools for the green producing streptococci which have an affinity for every tissue in the human body.

You have always noticed a great deal of tonsillitis in every epidemic of influenza. This indicates that the tonsils are working and keeping back the deadly organisms from the lymphatic channels which would convey them to the brain, lungs, heart, nerves, muscles, joints, etc. I have, on many occasions, swabbed deep into the tonsil craters and found tubercular bacilli. I have removed tonsils that were worn out resisting tubercular infection. I have seen the tonsils attacked by syphilitic infection. I have had patients sent to me to have tonsils removed when they only had a syphilitic infection, the tonsils standing as a battlement, a defense and shield, between the spirochetes and the lymphatic channels which would quickly convey these passengers to the brain, the cord, or to any organ in the human body. When the tonsils wear themselves out with well doing, they become, themselves, a menace that is dangerous to health and life—*then* they should be removed. The best results I have gotten from tonsillectomy are in aged people, from 40 to 75 years of age.

Surgeons

IN NORTH and South Carolina, thanks to the Duke Foundation Fund, every town of any size has a good hospital, and there is a lot of surgery being done. Many of the surgeons have gone to some medical center and have taken (God save the mark!) an "intensive course" in surgery, of six to not more than eight weeks. No man who ever lived can learn surgery in so short a time. Surgery is not to be learned in weeks or months; it gives too much to demand so little. Every great surgeon comes from the *dead house*, the *dissecting* room, where a thorough knowledge of anatomy and tissue is learned. Then all surgical operations should be practiced over, over and over again on the cadaver before the living subject is attempted. After this, a few years as a journeyman under some old, well-equipped and successful surgeon—and even then at times he will feel like Hippocrates did when he said *"experience is fallacious and judgment difficult."*

The medical colleges of today are teaching the young men the intricate laboratory procedures, useful only to the technician, and this includes pathology, histology, embryology, bacteriology and certain of the more delicate diagnostic procedures, made useful only to research workers. All the laborious days and studious nights that have been given to the above, are at the expense of clinical observation. I have found that the young graduate in medicine knows little of materia medica, therapeutics and pharmacology. He opens an office and proclaims himself ready to practice medicine, with no knowledge of materia medica, therapeutics or pharmacology. He becomes at once an easy prey to the detail man who represents one of the many manufacturing chemists, who brings to him prescriptions already written, already compounded, a formula under a *trade-name,* a sovereign balm for every disease that human flesh is heir to!

Cod Liver Oil

—*A Five-Year Study of Its Value for Reducing Industrial Absenteeism Caused by Colds and Respiratory Diseases*—

by

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EARLIER communications[1] have called attention to the excessive economic loss caused by industrial absenteeism.

Mills[2] has reported that lost time caused by illness amounts to more than 250,000,000 working days per year for the 36,000,000 employees in the United States, and Brundage[3] has reported that colds and respiratory diseases constituted over 42% of the illnesses of industrial employees. In other words, the average wage earner in the United States is absent from work on account of illness seven days per year, and of this time three days are caused by colds and respiratory troubles. This means that the total lost time per year for the 36,000,000 wage earners caused by colds and respiratory diseases amounts to 108,000,000 days.

The United States Department of Labor reports[4] that the average wage earner receives $21.42 for a 37.4 hour week. Hence the industrial "lost time" caused by colds and respiratory diseases represents an annual waste of $494,836,363.68. Thus, considered solely from a financial standpoint, it is highly important to study methods which offer promise for reducing this enormous economic waste.

Early studies with children attending public schools in the East[5] and Middle West[6] showed that the daily administration of cod liver oil tended to reduce the incidence and severity of colds and the consequent loss of time from school. In view of these results it was decided to test the value of cod liver oil for reducing industrial absenteeism caused by colds and respiratory diseases. Accordingly an investigation was planned which should be sufficiently extensive to yield data that would permit fairly definite conclusions.

THE subjects of the investigation were men and women whose ages varied from 18 to 60 years. They were engaged in varied activities, such as light and heavy machine work, general office work, laboratory work and a variety of unclassified tasks. In selecting the subjects for the investigation an attempt was made to secure a general cross-section of wage earners. Thus the subjects included those which were underweight, overweight and of approximately ideal weight. The method of classifying subjects according to body weight has already been reported in detail.[1]

The study was conducted when colds and respiratory diseases are most prevalent, and the subjects were under observation for a 20-weeks period which lasted from November to April. Inasmuch as the climatic conditions during this period are subject to yearly variations and the incidence of colds and respiratory diseases is variable from year to year, it was recognized that in order to obtain data of general application it would be necessary to continue the study over a series of years. Accordingly observations were made for five consecutive years.

In selecting the control subjects an attempt was made to duplicate the age, sex, body weight, nature of work and other conditions existing for the subjects of the experimental group. Unfortunately the control subjects were not true controls. Those individuals who were habitually inclined to have colds during the winter months naturally wished to be included in the cod liver oil group. On the other hand most of those who ordinarily had few and infrequent colds were reluctant to join the cod liver oil group. As a consequence those who were considerably troubled with colds predominated in the cod liver oil group and those who were relatively free from colds predominated in the control group.

Theoretically the subjects should be so divided that the experimental and control groups will include the same number of individuals. While this may be obtained with laboratory animals it is exceedingly difficult and generally impossible to attain it in observations with human subjects, for in any large group of individuals engaged at industrial tasks resignations, dismissals, retirements, transfers and deaths continuously cause variations in the size of the groups under observation. Hence it is impossible to foretell the number of subjects that will remain in any group at the end of a 20-weeks period.

Many investigators[7] have noted the effect of Vitamin A on increasing the resistance of the body to various types of infections, and some have studied the value of Vitamin A for increasing resistance to colds and respiratory diseases. Nevertheless it is impossible to estimate the amount of a Vitamin A rich cod liver oil which should be administered to a large group of subjects in order to produce uniform results, for the Vitamin A intake of such a group of subjects varies over wide limits and the body stores of Vitamin A are also extremely variable. However for the purpose of this investigation it was decided that approximately one half of the subjects should receive five tablespoons of cod liver oil per week during the daily rest periods.

Daily records were made of whether the members of the cod liver oil and control groups were present or absent from work. In case of absence the cause of absence was noted, but no one was included in this study whose absences were due to injury, surgical operations or any cause other than illness. The absences caused by colds and respiratory diseases have been correlated and summarized. In order to facilitate a comparison of the absences of the members of the cod liver oil and control groups the absences are reported (Table 1)

as average hours lost per subject for the 20 weeks experimental period. The reported data also include a comparison of the absences of both the cod liver oil and control groups with the absences for the same groups during a corresponding period of the year previous. This type of comparison has been made for each of the five years of the study. As will be evident from an inspection of the table, the subjects of the cod liver oil and control groups were not identical from year to year.

On referring to Table 1 it will be noted that the number of subjects participating in this study was 341 for the first year, 566 for the second year, 691 for the third year, 648 for the fourth year and 785 for the fifth year. It will be further noted that for each of the five years of the study the group of subjects receiving cod liver oil were absent from work less time than the corresponding control

Date	Number of Subjects		Time Lost Per Subject-Average		Change Over Previous Year	
	Cod Liver Oil Group	Control Group	Cod Liver Oil Group Hrs.	Control Group Hrs.	Cod Liver Oil Group Percent	Control Group Percent
Control Period*	213	128	19.1	17.4	....	....
Expt. Period	213	128	12.4	25.1	+35.1	—44.3
Control Period	284	282	27.5	36.2	....	....
Expt. Period	284	282	15.3	26.5	+44.4	+26.8
Control Period	348	343	19.0	16.5	....	....
Expt. Period	348	343	12.3	16.3	+35.3	+ 1.2
Control Period	339	309	14.5	12.3	....	....
Expt. Period	339	309	10.7	14.8	+26.2	—20.3
Control Period	377	408	15.3	13.2	....	....
Expt. Period	377	408	12.9	19.9	+15.7	—50.7

* The control period was a corresponding 20-weeks period 12 months preceding the experimental period

Table 1. Results of the Administration of Cod Liver Oil on Industrial Absenteeism

group which received no cod liver oil. During the first year the average time lost per subject for the cod liver oil group was 12.7 hours less than for the control group. This means a gain of 2,705 hours for the group of 213 subjects. The average time lost during the second year for the cod liver oil group was 11.2 hours less than for the control group or the cod liver oil group as a whole was absent 3,181 hours less than if they had been included in the control group. The lost time for the cod liver oil group during the third year was four hours per subject less than that of the control group. This represents a gain of 1,392 hours for the entire group. During the fourth year of the test the subjects received cod liver oil averaged to be absent 4.1 hours less than the control group which represented a gain of 1,390 hours. During the final year of the test the subjects receiving cod liver oil were absent on the average seven hours less than the control subjects, which is equivalent to a gain of 2,639 hours for the whole group. The combined gains of the group which received cod liver oil for the entire five year period was 11,307 hours. Obviously such a reduction of industrial absenteeism by administering cod liver oil is of definite importance, both to the wage earner who thereby receives more income and to the employer who experiences less interruption in the routine of manufacturing processes.

In each of the five years of this study the grou of subjects which received cod liver oil was abser less than for a corresponding period the previou year. This consistent improvement varied fro 15.7% during the final year of the test to 44.4% during the second year of the test. Considerin the five-year test as a whole, the 1,561 subjects wh received cod liver oil for the various 20 weeks experimental periods were absent 30.9% less time than during the coresponding control periods. On the other hand the absences of the control group were more erratic. During the second and third years the control group was absent 26.3% and 1.2% respectively less for the experimental than for the control period but during the first, fourth and fifth years of the study the control group was absent on the average 44.3%, 20.3% and 50.7% more hours during the experimental period than during the control period.

A review of the results of this five-year study will show that the cod liver oil groups gave consistent results from year to year. In each of the five years the subjects of the experimental groups were absent from work, on account of colds and respiratory diseases, materially less time than the subjects of the control groups. Also during each of the five years the subjects who received cod liver oil were absent considerably less time than during a corresponding period the year previous. The advantage of conducting a study of this sort for a number of successive years is indicated from the results obtained with the control groups. As pointed out above, during the second and third years of the test the control groups were absent less time during the experimental periods than during the corresponding control periods. On the other hand the subjects of the control groups were absent during the first, fourth and fifth years far more during the experimental than during the control periods. It is quite evident from these observations that if a single year is used as a basis of consideration quite different conclusions might be drawn from the results obtained. For instance, one would not draw the same conclusion from the results of the first as from the results of the second year test. Nevertheless in each of the five years under consideration the group which received cod liver oil showed a superiority over the corresponding control group.

THESE results substantiate the findings of several investigators who have conducted somewhat similar studies. Beard[8] reports that following the ingestion of cod liver oil concentrate tablets by 36 medical students, "There was a reduction of about 50% in the incidence of colds, and 68% of those that did occur were of the mild type." Gardner and Gardner[9] found that "Vitamin A plays a definite role in decreasing the incidence and severity of colds among school children. Increased resistance is accompanied by a higher degree of general health, as is shown by an increase in weight." Cameron[10], who observed the effect of Vitamin A upon the incidence and severity of colds among college students, says Vitamin A in cod liver oil "reduced the average number of colds little, if at all, in a group of over 200 students studied from October to April inclusive. The average duration of colds, however, was reduced by such treatment by from five to 10 days per studen

—approximately 50% of students reported improvement in endurance, sense of well-being, appetite, or skin eruptions."

Summary

A FIVE-YEAR study was made to determine the value of cod liver oil for reducing industrial absenteeism caused by colds and respiratory diseases.

The subjects of the study were men and women judged to be fairly typical of industrial employees as regards age, weight, and type of occupation. The number of subjects, 3,031, which assisted in this study was judged sufficient to yield reliable results—there were 341, 566, 691, 648 and 785 for the first, second, third, fourth and fifth years respectively. Slightly over one half, 1,561, of the subjects received five tablespoonfuls of cod liver oil per week at the morning or afternoon rest periods. The remainder served as controls. As a further control the absences of both experimental and control groups for the experimental periods were compared with corresponding (control) periods during the year previous.

In each of the five yearly tests the cod liver oil groups were absent materially less time than the control groups.

In each of the five years the cod liver oil groups were absent significantly less time than during the corresponding period the year previous, but this was not true for the control groups.

These results indicate very definitely that cod liver oil is of value for reducing industrial absenteeism caused by colds and respiratory diseases.

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Post-Trauma Psychoneuroses

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I AM bringing to you a subject that should attract the attention of the present day traumatic surgeon.* The subject of "Post-Traumatic Psychoneurosis," the shell shock of industry, the "nervous breakdown" following accidents. I am confident I am not prepared to tell you many things of importance about the subject. I do hope, however, that I may bring fourth discussion that will be of some benefit, because the surgeon of today has to keep an open mind and try to recognize this trouble at the earliest possible time.

In the present day trauma, I believe the percentage of neuroses is higher than in the old "horse and buggy" days. We have the most severe injuries now as a result of our good highways and fast automobiles. The rate of increase is astounding. The automobile accident deaths alone in 1920 were 11,061; in 1925, 19,610; in 1930, 30,288; in 1935, 36,694. We are killing more people annually on our highways alone than we lost in the World War. There were 36,694 killed in the war; and 13,691 died of wounds—a total of 50,385. The National Safety Council announced 99,000 accidental deaths for 1935.

The majority of traumatic deaths, and certainly the greater majority of psychoneuroses, come from an injury directly or indirectly to the head and spine. Swift states that there are approximately 112,000 cases of skull fractures annually in the United States. It would be interesting to know just the number of psychoneurotic cases that follow this great amount of trauma. One would certainly be astonished at the cost to industry of these sad and complex cases.

I know you wonder why I am bringing all this discussion of trauma and its effect to an Association of Railway Surgeons when the railroads of the United States did not kill a single passenger out of an average of 51,368 per hour that boarded the trains in the year 1935. You are called upon, however, to treat the trauma occurring in industry, in the home and on the highway, and you, more and more, are going to have to cope with that most distressing sequela—psychoneurosis. All of us remember the patient who had an injury, and in a few hours or few days developed a psychoneurosis varying in degree, and quite often the neurotic symptom complex was very much greater than the slight injury would indicate.

The author wishes to eliminate all cases of malingerers from this discussion. Sometimes, however, it is not such an easy job to brush them aside.

LET US try to understand the subject—that is, the difference between neurosis and psychosis. The psychotic lives in a world of fantasy. The neurotic lives in a real world, his difficulties are greater than they are for normal persons, but they are the same difficulties we all have. The difficul-

* Presented at the Thirty-Ninth Annual Meeting of the Association of Surgeons of the Southern Railway System, Knoxville, Tenn., June 16-18, 1936.

ties of the psychotic are those of one living in another world not subject to ordinary physical laws. The neurotic can be made aware of the irrationality of his neurosis. The psychotic is not conscious of his psychosis.

All people if they are above the average mentally may be neurotic. Some psychiatrists say that if you are not neurotic then you are a moron. You remember the old saying: "All the world is queer except thee and me, and even thou art a little queer."

The cause of neurosis is the collision of a neurotic with a problem he cannot surmount. The neurotic background in the patient's history, both as to inheritance and environment, has to be considered. You can see here the importance of a most careful history and investigation into the individual's own neurotic personality.

We have the functional and the organic psychoneuroses. The functional neurosis is caused by fear. Anxiety states are the most common. Fear of some permanent disability is often caused by a thoughtless relative, friend, or nurse saying something soon after the patient has partially recovered from shock or regained consciousness. They usually talk carelessly and often mention the possibility of a permanent disfigurement. This at once places before the patient a problem that he cannot surmount.

The anxiety states are caused by a desire to get the greatest compensation for the injury. We all remember the post-war days when our offices were filled with men with all kinds of ills, and neuroses. We also remember how these cases disappeared like magic after what I think was the greatest prescription of all times, written by President Roosevelt and Mr. Douglas, the order which made it necessary for the illness to be service-connected.

These functional neuroses suffer from morbid states of mind caused by suggestions. Sometimes these suggestions come from those who are interested, not in the patient's physical well-being, but in some monetary settlement of the case.

These cases may have various and complex symptoms: heart palpitation, limb weakness, may walk with a limp. They sweat easily, get out of breath, cannot digest food; even at times are in a mild delirium.

The other functional causes are: domestic friction, financial worries, sexual frustration. You may say this is not connected with traumatic neurosis, but where there is trauma any one of these may be the underlying reason or predisposing cause for a severe neurosis; even though at times the trauma may be very slight.

Defeat breeds neurosis. This is true in personal affairs as well as it has been so many times in military affairs.

War neurosis is very much like peace-time neurosis. It is an escape from what the patient considered an unbearable situation.

The Editor of FORTUNE reports that one German hospital had no shell shock cases until the army was turned back at the Marne; and the Allies' advances in 1918 greatly reduced the British army mental cases.

You can see here the picture of a man in civilian life with financial, physical, or domestic defeat at his door. This man having a railway accident, the chance for neurosis is very high. It is in these cases that the surgeon with the aid of the claim department can trace the cause of some of these functional neuroses. The functional neuroses have been estimated to represent from 40 to 70% of all neuroses.

THE organic causes following trauma are due to molecular changes in the central nervous system resulting from the changes in the circulation or intra-cranial pressure. Let us remember that the brain cannot long be subjected to a pressure that interferes with cerebral circulation without causing cerebral degeneration or death. The cause of death in these cases is due to trauma or pressure on the vital centers at the base of the brain in the region of the third ventricle, medulla and pons.

The brain injury that causes organic neurosis is the one that causes pressure upon the cerebral hemispheres and cerebellum. We have here a change in the intelligent reaction and post-traumatic behavior of the patient which is rather typical. A prolonged pressure causes degenerative changes that later give the psychic manifestations, loss of mental function, apparent paralysis, and anesthesia. A damage to these centers of intelligence causes prolonged post-traumatic sequellae.

This type, to a great degree, can be prevented by the proper management of the acute head injury cases. It can be prevented by controlling the amount of intra-cranial pressure, by rest, dehydration, lumbar puncture, and in some cases by decompression operation.

There are other organic post-traumatic psychoneuroses which are due to an underlying biochemical factor; as in dysfunction of the thyroid, parathyroid, ovary, and suprarenal glands. The dysfunction of one or more of these glands caused by the shock of the trauma brings on a more rapid shift in the physical chemistry of the body. The sudden change in the biochemical factors seem to make the entire nervous mechanism abnormally sensitive and more unstable.

This fact has been brought out in the recent work of Dr. Crile in his experimental laboratory in the jungles of Africa. The experiments were carried out upon wild animals. The tiger family registered the greatest reaction and the quickest flash upon the physiological and biochemical factors due to its very large suprarenal and sympathetic nervous system.

Toxemia is also an underlying cause for psychoneurosis: abscessed teeth, pyorrhea pockets, prostatic infection, chronic pyelitis or any low grade infection. Syphilis is the cause of psychosis, as in general paresis.

Alcoholic psychosis, acute and chronic forms, present a patient with hallucinations, hyperesthetic areas in the skin, speech defects, tremors, polyneuritis, and even epileptiform attacks.

Senile neurotics represent about 19% of all mental patients admitted to our state hospitals.

Again you may say these have little bearing on trauma. I am sure the effect of shock upon the suprarenal and sympathetic nervous system producing a rapid shift in the biochemistry of the body must be considered. One cannot forget the importance of the effect that chronic alcoholism, toxemia, and syphilis may have in causing all kinds of nervous disorders precipitated by trauma. Senility cannot be overlooked.

An important part of the treatment is the taking of a good personal and family history, the socia

environmental history and history of neurosis. Let the patient talk freely of his symptoms without your aid or suggestion. It is here that important decisions must be made. We decide the apparent genesis of the neurosis. We consider the relative weight of the psychogenic, somatic and environmental social factors. We try to decide whether it is functional or organic. The most important step in the treatment is to convince our patient, and ourselves, that you have not left one thing undone that might show the underlying cause of the trouble. To build up confidence in the mind of our patient is very important. Sometimes seemingly unnecessary x-ray pictures and laboratory work may have to be resorted to to relieve the patient's mind of some great dread. All this care will help you get the cooperation of the patient.

We cannot treat these patients lightly, and say their trouble is just imaginary. This attitude is as senseless as it is cruel.

An old British doctor once said: "When a man is so ill as to think he is ill, when he is not ill at all, then he is very ill indeed." Sir James Paget, discoverer of Paget's disease said: "The patient says that she cannot, the nurse says that she will not; the truth is she cannot will."

SO YOU see there is nothing new in the condition of these sick and semi-sick minds. I do believe our case study and treatment have improved. We know now that we have to know the genesis—that is, whether it is functional or organic. We must remove the cause as nearly as possible, as in other diseases. We too often make no attempt to manage the environment, and the patient is left to the mercy of sympathetic relatives who unwittingly exaggerate the injury. He is left an open prey to all callers, and some of ill repute, who foster in his mind the belief that he has been seriously hurt and is entitled to large compensation.

One of the most important things in the treatment is the selection of a nurse. She should understand the psychology underlying the recovery following trauma. She should be very strict in the control of the patient's family, and his visitors, and that army of people who hang around to get a part of his compensation. In short she should control his environment.

In closing let us remember that, following trauma, every patient is potentially a subject in whom psychoneurosis may develop. We should do what we can to prevent it, mainly by energetic control of the patient's environment.

In the event this complication arises we should consider the social, hereditary, economic, mental, physical, emotional and spiritual aspects of each case, and keep adequate case records of our findings. The keeping of neurological findings is just as important as the records of the end results of a fracture or the function of a joint. Potentially an injury on a railroad or in an industry at a future date may become medicolegal in character.

It is so important, economically, to industry and to the patient for the traumatic surgeon to prevent when possible, and to recognize, record, and treat, this complication at the earliest possible time.

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Minimum Fees

FEW things are more useful to the physician yet more dangerous when they get into lay hands than a schedule of minimum fees.[1]

In most cases the distribution of such schedules has been carefully controlled. But in at least one state recently there appears to have been a leak. Copies of a schedule of minimum charges under the workmen's compensation law of New York found their way into the offices of a number of laymen, one of whom happened to be an editor of the New York *Sun*.

Three hundred thousand present and prospective patients who read the *Sun* were promptly treated to an editorial on "What to Pay Doctors." A forearm bone graft, including postoperative therapy, "can be had for $175," it said, by way of illustration. "The price set" on an amputation of a phalanx, "including six weeks of care, is $30."

"Doctors should not be too much surprised," the editorial continued, "should they begin shortly to receive letters along this line:

"Dear Doctor:

I am returning herewith your bill for setting my broken arm, and my subsequent visits to you. I see by line 170 of the Minimum Medical Fee Schedule that the State of New York has officially, with the advice of the State Medical Society, fixed $50 as the proper fee in this region for treatment of a fracture of the radius or ulna, including two months of after care. I am, therefore, inclosing a check for that sum, instead of for the amount of your bill. If large industrial corporations or insurance companies don't have to pay any more, I don't see why I should.

Yours truly, &c."

Thus, in this instance, patients have been given to understand four things: (1) that the *state* has compiled a list of medical fees (2) that a copy of the list can be obtained from the state industrial commissioner, (3) that the fees designated are the proper fees to pay, and (4) that by means of the foregoing letter they can probably effect a substantial reduction in any outstanding doctor's bill.

Nowhere in the editorial was any emphasis placed on the fact that the fees referred to are *minimum* fees. Nor was any explanation of the sliding-scale given so that patients might understand why charges for an identical treatment vary appreciably among patients of different means.

Incidents of the kind described here are not commonplace. But they will become so if minimum fee schedules continue to be strewn around indiscriminately.

Back Troubles

A PHYSICIAN at Lee Olwell's last evening was relating some psychological phenomena of his calling.[2] As general practitioner, he discovered people who bear great burdens—men high in public office, heads of great industries, etc.—suffer with back troubles. As though the burden was too great to carry. He also said he never knew a person who ate exactly what hunger dictated, without fear, suffering stomach complaints. He was thoroughly antidiet.

1. *Medical Economics*, June, 1936.

2. From O. O. McIntyre's Daily Column, *Chicago Herald-Examiner*, July 29, 1936; Copyright, McNaught Syndicate, Inc.

Industrial Medical Conference

—Abstracts of the Presentations of a Two-Day Conference Sponsored by Employers Mutuals, Wausau, Wisconsin July 27-28, 1936.—

EMPLOYERS MUTUALS, of Wausau, Wisconsin, celebrated its 25th anniversary year by holding a two-day industrial medical conference of physicians and surgeons from the middle west, on July 27-28, 1936, at Wausau.

As stated in the invitation, "the purpose of this meeting is to improve, by cooperative efforts of both doctors and our company, the quality of medical service rendered in industrial cases."

That this meeting was successful as to its purpose is well indicated by the program subjects, the reputation of the speakers, and also by the attendance and spirit of the meetings. Approximately 700 doctors were in attendance, and at the banquet on the evening of July 27 nearly 900 persons sat down to dinner.

The program was divided into morning and afternoon sessions and was held in the Grand Theatre, which afforded ample seating capacity as well as comfortable conditions. The program follows:

July 27—Morning Session:

Welcome by the company—B. E. KUECHLE.

Address of Welcome—J. F. SMITH, M.D., Chairman.

"The Relationship of the Medical Profession to the Compensation Law,"—HON. VOYTA WRABETZ, Chairman, Wisconsin Industrial Commission.

"Modern Treatment of Brain Injuries,"—ERWIN SCHMIDT, M.D.

"Discussion"—J. L. GARVEY, M.D.

July 27—Afternoon Session:

R. M. CARTER, M.D., Chairman.

"Eye and Ear Defects caused by Brain Injuries," —W. E. GROVE, M.D.

"Discussion"—A. I. ROSENBERGER, M.D.

"Observations on the Functional Treatment of Fractures with Special Reference to Foot and Ankle" (Illustrated with motion pictures)—JOHN O. DIETERLE, M.D.

"Back Injuries"—M. L. JONES, M.D.

July 27—Evening Session:

The banquet session was held at the Rothschild Pavilion, approximately five miles south of Wausau. The guest speaker of the evening was DR. MORRIS FISHBEIN, Editor of *the Journal of the American Medical Association.*

July 28—Morning Session:

C. M. ECHOLS, M.D., Chairman.

"Surgical Treatment of Peripheral Nerve Injuries"—A. W. ADSON, M.D.

"Injuries and Disabilities of the Shoulder Joint" —EDWIN W. RYERSON, M.D.

"The Diagnosis and Management of Major Infections of the Hand"—MICHAEL L. MASON, M.D.

"Discussion"—ALBERT TORMEY, M.D.

"The Treatment of Compound Fractures and Contaminated Wounds"—JOHN W. POWERS, M.D.

July 28—Afternoon Session:

ARTHUR G. SULLIVAN, M.D., Chairman.

"Internal Derangements of the Knee Joint"—J. ALBERT KEY, M.D.

"Discussion"—GEORGE R. DUNN, M.D.

"Laboratory Aids in Industrial Medicine and Surgery"—NORBERT ENZER, M.D.

"Some Reflections on Bad Results"—ROBERT E. BURNS, M.D.

July 27—Morning Session

B. E. KUECHLE, of the Employers Mutuals, welcomed the guests to the conference by giving an outline of the history of the company, stating that the group was organized 25 years ago. Allusion was made to early compensation experience and the appointment of a commission to study conditions in Europe of which Judge Sanborn of Ashland was the chairman and which stated in effect that prompt and reasonable compensation and prompt medical treatment were the objectives of compensation law. This law became effective September 1st, 1911. There is no justification for an insurance company sponsoring a medical meeting unless it is possible through such means to improve methods of treatment; arrangements had been made through the Marathon County Medical Society and the State Medical Association in cooperation with Employers Mutuals to arrange for the program. The attorney of the State Federation of Labor was also contacted with regard to these meetings and his approval secured. Since Wausau is in the heart of Wisconsin, the keynote of this meeting is the opening of the hearts of Employers Mutuals to the invited guests.

DR. J. F. SMITH reviewed the passage of the Compensation Act of Wisconsin and the establishment of the Industrial Commission. Reference was also made to the difficulties with regard to new work and the establishment of Employers Mutuals. Dr. Smith spoke on behalf of the Marathon County Medical Society and graciously congratulated Mr. Kuechle and other officials of the Employers Mutuals for arranging the program.

HON. VOYTA WRABETZ, Chairman of the Wisconsin Industrial Commission, spoke on the subject "The Relationship of the Medical Profession to the Compensation Law." There is now no question of the industrial responsibility for the protection and compensation of employees suffering injuries and disability because of industrial accidents and this principle should not be considered one of benevolence. An important change occurred in the Wisconsin Compensation Law in 1919, when occupational disease compensation was added. The principle of compensation confers two benefits, namely, the administration of competent medical, hospital and surgical care, and, second, the payment of compensation. There has been, therefore, an important urge to prevent injury and disability and also an added impetus to the procedures used in the problems of physical restoration. It has been very evident that the medical profession is a controlling factor in this work. In this state the employer names a panel of physicians for proper selection. The employer of course is interested in

a speedy return to work and is probably better informed than the employee on the availability of special advice and service. The actual operation of this principle shows that the employee really exercises the right of choice without strict adherence to the panel. The physician is in an unusual position between the employer and the employee. Consultation is desirable in certain cases and should be welcomed always. Curative workshops play an important part. Confidence must be established between physician and patient. It is the responsibility of the physician to cause the employer and the employee to understand what work the employee is to avoid because of previous disability or injuries—too frequent failure to do this causes difficulties. A grave problem is the prevention of neuroses. The responsibility of the physician is quite definite in determining the nature and extent of disability, and the physician should not be too sanguine perhaps about the results of his work. The estimation of disability should have no relationship to fees paid the physician, and should be especially determined after return to work. It has been found by experience that the most satisfactory way of determining the disability is by the so-called case method. The whole question of proper compensation rests almost entirely on the information provided in physicians' reports. The records of the Commission show that from September 1, 1911, to December 31, 1935, 396,397 cases were handled by the commission at a cost of $18,779,395 for medical expense. Medical expense constitutes approximately 33% of the entire cost of handling the cases, not including disabilities of less than three weeks' duration. The increased cost of medical service in the last 10 years probably has occurred because of the use of better and more modern treatment methods. The so-called contested cases which constitute 15% of the total number of cases give the greatest difficulties. Important items are the determination of permanent and total disability and the differentiation between disability sustained because of injury or occupational disease. Great dependence, therefore, is placed on the medical profession. It should be remembered that unbiased information is the most valuable type. In the field of differentiation between disability sustained because of injury or occupational disease there is considerable difficulty —the medical profession should here keep in mind that there is an important relationship as to cause and effect and that conjecture is not reliable. Obscure etiology is a particularly difficult factor in such cases. It must also be kept in mind that the physician cannot became an advocate in the hearings. Finally, the whole success of the compensation law depends upon the skill and judgment of the medical profession, and the success which has been attained in this state has been very largely through such skill and judgment of the medical profession. But the group should weed out its obnoxious members and should strive to gain the confidence of the employer, the employee, and the general public.

Dr. Erwin Schmidt spoke on "The Modern Treatment of Brain Injuries." Dr. Harvey Cushing has been credited with stating at one time that an injury to the brain is more important than a fracture of the skull. In 1929, 51% of brain injuries were fatal, whereas the mortality rate has been reduced to 14%, according to recent figures. It is important to consider all tissues of the head together, and to keep in mind that the ultimate results are largely determined by the nature of the first treatment. Various anatomical peculiarities were considered and the relationship of injuries to these. Infection plays a very prominent part. In considering the physiological and anatomical facts concerning brain injuries we have a closed cavity in which soft tissue and fluids are enclosed. Mechanically there is very little compression possible without injury. Brain tissue swells and the fluids are forced into the cerebrospinal spaces, further compression or swelling producing difficulty. The important centers are affected variously according to the type of injury, the first being affected is the respiratory center, then the vasomotor center and finally the cardio-inhibitory center. Shock and hemorrhage are common effects and may be followed by increased intracranial pressure and medullary failure. An increase in pressure causes a corresponding increase in stupor. In edema there is commonly no lucid interval. The changes which take place in the fundi are usually too late to be of help. A pulse below 40 or above 120 is unfavorable. An increased pulse pressure is more significant in a problem of intra-cranial pressure than the systolic blood pressure. An early temperature increase usually subsides—temperature is commonly related to centers involved and tissue injury. Of the various procedures at our disposal are the neurological examination, spinal puncture, encephalography, exploratory operation and x-ray films. It is always an advantage to have an x-ray of the head before leaving the hospital. The ideal to be kept in mind is the saving of life and the prevention of permanent brain damage. The treatment of shock is especially important, and sucrose and sodium chloride solution may be administered if found necessary. Physical and neurological examinations may be made, but the first consideration should be to treat shock. After shock subsides, attention should be directed to the stabilization of the blood pressure and pulse, and readings at half-hour intervals should be made. The spinal fluid may then be examined and further treatment procedures based on the results of this examination. The after effects are variable and complicated. Differentiation of psychogenic and organic factors is possible through the use of encephalograms. There is an inverse relationship between the blood pressure and the pulse in four different phases, at first the blood pressure falling and the pulse rising—later in increase of intracranial pressure the opposite effect is noted—still later these factors again change in medullary failure—and a further change is noted in the terminal picture. A comparison was made between the mortality percentage in a number of different studies as follows: (a) 39.5%; (b) 31%; (c) 40.6%; (e) 32.4%; (f) 29%; a collected series 26%; the author's series 23%; Mock's series 19.2%; Fay's series 18.3%; and a recent series analyzed by Fay showing 14.3%. Dr. Schmidt concluded that the guiding principle involved is to save life and prevent permanent brain damage — that there should be a thorough understanding of the pathology involved—that temperature, pulse, respiration and blood pressure readings frequently made are of great value—that the primary temperature indicates the gravity of the injury—that early spinal puncture is helpful—that the treatment of shock

is all important—that intravenous sucrose injections are of value—that dehydration decreases morbidity—that encephalography may give useful information—that the degree of final disability cannot be estimated in the primary phases, and that, finally, careful notes in detail should be kept for the patient's record.

In the discussion of Dr. Schmidt's paper, DR. J. L. GARVEY commented especially upon the new aspects of treatment. The neurological findings can be used as a definite aid in surgical intervention. Changes are most important, and not single observations. It is vital to determine the state of consciousness, and this is not always so easy. Among points emphasized were the action of the pupils, determination of nature and extent of paralyses, the tone of the extremities, and the state of the reflexes. Sensory skin tests are not very valuable. In the return to consciousness the neurological signs may not be so significent, except in delayed hemorrhage. Early and frequent and careful neurological examinations are greatly to be emphasized and these need not necessarily be made by specialists. No single method is to be considered the most important in the evaluation of diagnostic findings.

July 27—Afternoon Session

DR. W. E. GROVE, in presenting the subject "Eye and Ear Defects Caused by Brain Injuries," excluded gunshot wounds from his discussion. The injury may not produce fracture or unconsciousness. Comment was made on contre coup, swing movement and compression. The nuclei beneath the fourth ventricle are frequently damaged. The internal ear fluids may be set in motion—the greater damage to hearing occurring in the upper sound range. The greater number of fractures are basal, and of these most occur in the midcranial fossa, involving the hearing. Eye and ear examinations should be made early, particularly if headache is present. In the eye examination, of greatest importance are unequal pupils, loss of accommodation and inability to read at near point and also muscular imbalance. Other pathological causes for these findings must be differentiated. The examination of the ear should be made by an otologist in head injuries in the presence of headache or tinnitus. In a series reported in Copenhagen there were otoscopic changes in 35% of the cases. Hearing tests are not necessary in the early stage. When done the degree of hearing defect should be estimated by all means at our disposal, including the tuning fork, air and bone conduction, and the audiometer. The symptom of dizziness is produced by many different causes; but when the vestibular apparatus is involved, vertigo is the term which is reserved for this connotation. There is no truer sign of vestibular involvement than rotational vertigo, although other causes may exist. The determination of spontaneous nystagmus, past pointing, drift tests and examination of the gait are important. Caloric tests are helpful. Encephalograms and ventriculograms are of no great advantage—the information can be obtained in other ways. In closing, the tests as mentioned and indicated will well repay the time and effort expended.

In discussing Dr. Grove's presentation, DR. A. I. ROSENBERGER considered only the common neuropsychiatric problems and confined these to head injuries in workmen. The approach to these problems has become more conservative. Spinal puncture is not ordinarily needed. Encephalograms and ventriculograms are not indicated in most instances. Headaches and dizziness are common symptoms. Great care should be exercised during the examination in the avoidance of creating a wrong impression on the patient, forming a basis for a psychoneurotic difficulty. Fear and worry are more damaging than organic disease. Continued education of the patient by the physician is good psychotherapy, and more often helps in rehabilitation than drug therapy. The physician has great responsibility in the mental and physical rehabilitation of his patient in these types of injuries.

DR. JOHN O. DIETERLE spoke on "Observations on the Functional Treatment of Fractures with Special Reference to Foot and Ankle." The recent translation of Bohler's book has given great impetus to the treatment of fractures and changes in the methods. A fundamental in the treatment of fractures is the conception that the limited use of parts occurs while being treated. Prolonged immobilization without movement will produce bad results, prolonging functional restoration. Molded plaster splints are often efficacious. X-ray examinations should be done as frequently as possible. It is possible to get excellent functional results even with what appears to be mediocre x-ray alignment. Motion picture films were shown of Dr. Bohler putting up a fracture of the tibia, first injecting a solution of 2% novocain for local anesthesia. In this instance the fracture was splinted and traction exerted for a period of three weeks; the leg was then put in plaster, and a walking iron provided up to the ninth week. Demonstration was then given of the application of an Unna boot and the patient was walking at the tenth week. The next case demonstrated Dr. Bohler in the motion picture was that of fracture of both malleoli. These were molded by hand and plaster applied. A film demonstration by Dr. Bohler was also given showing the treatment of fractures of the os calcis. Spinal anesthesia was administered and the swelling around the heel massaged. A Steinmann pin was inserted above the fracture and another one through the heel, traction then being exerted. By means of a vise a reduction of the widening of the os calcis through compression was accomplished. The leg was then put up in a plaster cast. The essayist remarked that he used Kirchner wires instead of pins. Later on a walking iron is placed in the cast.

DR. M. L. JONES completed the afternoon program of the first day in speaking on "Back Injuries." Backache occurs in 10% of all individuals having focal infection. This symptom is most difficult to evaluate. A review was given of the anatomy of the back and an outline of the examination, by reference to lantern slides. Various types of pathology were demonstrated by x-ray photographs on lantern slides including fractures of vertebra, ramifying osteitis, arthritis, injuries to the lumbosacral and sacroiliac joints, congential anomalies, and other conditions. Important in interpreting the cases is attention to changes due to age and the kind of changes which occur. It should be emphasized that there are two kinds of functional pain, namely referred and essential. In the diagnosis the history is very important, as is also a complete physical examination, particularly with ref-

erence to examination in the sitting, standing and prone positions, as well as supine position. In conclusion, an early return to work often makes the difference between success and failure.

July 27—Evening Session

THE dinner session was held at the Rothschild Pavilion about five miles south of Wausau, the guest speaker being Dr. Morris Fishbein, of the American Medical Association. Dr. Fishbein talked on the changing times, and contrasted the doctor of today with the one of 1890. In his usual rapid-fire manner, Dr. Fishbein interspersed with facts and figures his usual ironical and humorous references to the practice of medicine in the gay nineties as contrasted with modern times. The audience thoroughly enjoyed Dr. Fishbein's little verbal excursion, as well as his pointed allusions to the differences in the practice of medicine of today and yesterday.

July 28—Morning Session

HON. WM. H. WISE, Commissioner of Labor and Industry of Michigan, emphasized the necessity for clarity and conviction on the part of the medical men in presenting facts to the commissioners in cold type. This is one of the greatest difficulties which commissioners have, according to Mr. Wise.

Mr. Harry McLogan, of the Wisconsin Industrial Commission, congratulated the Employers Mutuals on the 25th anniversary, but congratulated this company a great deal more on its successful efforts in the prevention of injuries in industry.

Dr. A. W. Adson spoke on "Surgical Treatment of Peripheral Nerve Injuries." First the physiology and pathology of paralysis were considered, then operative methods and then postoperative care. A series of lantern slides was shown depicting experimental work on animals, especially affecting the cross-section of severed nerves. The histological and pathological changes in these nerve sections were well shown on the lantern slides. This included regeneration processes. Because birth palsy may give injuries similar to those found in industry and particularly with relation to injuries of the brachial plexus, several lanterns slides of this condition were shown and discussion of a number of anatomical cadaver specimens was also demonstrated on the lantern slides. It was explained how by torsion in different directions different effects were produced in the tearing of the nerve roots in the brachial plexus. This is especially important since brachial plexus injury is the most serious type of injury to the peripheral nerves. Other injuries not uncommonly affect nerves, such as injuries in the wrist, musculo-spiral injury after fracture of the humerus, and various others. In operating on peripheral nerves, the best technique is an end-to-end suture without tension. Grafts do not turn out so well in most instances. In some cases of neuroma it is sometimes possible to make multiple incisions in the nerve longitudinally and turn out the scar tissue. Facial paralyses are also produced by various types of injuries. Transfer of nerves may be necessary in some instances, particularly affecting the spinal accessory or the hypoglossal. Back injuries frequently cause injury to the peripheral nerves and in such conditions an injection of novocain into the sacral canal may be good procedure and the use of lipiodol for diagnosis may be advisable. Another situation in which peripheral nerves become important and may be injured is in the case of cervical ribs. The operation to relieve this is to cut the scalenus anterior after making use of a blood pressure test by which the pulse is obliterated in turning the head to the side on which pain occurs. Experience has shown that in quite a number of instances regenerated nerves return to function much better than transplantations. In summing up, Doctor Adson believed that nerve injuries were of great importance in industrial surgery—that expectant treatment should be used up to a certain point—that the reactions of the nerves should be studied very closely — that suturing should not be put off too long.

Dr. Edwin W. Ryerson, in discussing the subject "Injuries and Disabilities of the Shoulder Joint," showed a series of interesting lantern slides. First, a series of fractures of the surgical neck of the humerus and displacement of the head were shown on the lantern slides. In one instance there was a separation of the epiphyseal portion. An interesting demonstration was that of a fracture in a tabetic with considerable bone formation and a case of gumma of the head of the humerus. A fracture of the tip of the clavicle was unusual in that it was fractured far out near the end. Another instance of unusual fracture was a separation of the clavicular-acromial joint; this was treated by a special operation which is called the fascia lata suture. Another case was shown in which there was a fracture of the body of the scapula which was treated by a sling support for the arm with excellent results. Calcareous deposits in the subdeltoid bursa often may give great difficulty not only in diagnosis but also in treatment—several cases of this sort were demonstrated on the slides. Another instance of unusual tumor of bone was a new growth in the head of the humerus which later showed up in the other side and proved to be bone cysts. Three cases of giant cell tumor of the head of the humerus were shown which were treated by removing the head and grafting bone. An instance also of osteochondroma was demonstrated. and, finally, the Nicola operation for transplantation of the long biceps tendon was described and diagrams shown.

Dr. Michael L. Mason gave the next presentation on "The Diagnosis and Management of Major Infections of the Hand." Early diagnosis is most important in this condition. Statistics of various commissions show that great frequency of infection of the hand exists. This is of great importance because the earning power of an employee largely depends upon proper hand function. An outline was shown dividing infections of the hand into three major groups, those called the minor infections, the specific infections, and what are known as the extensive major infections. The speaker confined his remarks to the major infections and emphasized the necessity of prompt and proper treatment. It is extremely important to know the nature of the process. The diagnosis is made very largely on a knowledge of the anatomy and the functions of the various parts. Slides were shown of the various bursae of the hand, the major fascial spaces both in cross-sections and in longitudinal sections. In tenosynovitis there is pain, swelling, flexion and local tenderness. The treatment of this condition is incision and drainage. Experience has

proved that through and through drainage, so called, is pernicious in its effects. The various incisions were detailed by lantern slides. General anesthesia and bloodless field are prerequisites for good operative technique. The acute spreading infections of the hand present an entirely different problem and here conservative treatment is the rule. A classification of this type of cases was outlined on the lantern slides. In this type of infection active surgical intervention should be delayed until there is no question of a suppurative localized process. The distribution of the lymphatics is especially important and several lantern slides were shown depicting the lymphatic distribution of the hand and the forearm. In acute spreading infections hot wet dressings are very important. These should be changed once every 24 hours and should be arranged of large fluffy dressings to which warm liquid is added and to which external heat may be applied continuously. In summing up, these cases of tenosynovitis and abscesses of the major fascial spaces should receive early incision and drainage while the acute spreading infections should be treated conservatively as outlined.

Dr. Albert Tormey, in discussing Dr. Mason's paper, stated that in 1930 the Wisconsin Industrial Commission issued statistics to the effect that 32% of all cases were hand injuries, of which 17% became infected. Emphasis is to be placed especially on the general anesthetic and the bloodless field—the avoidance of secondary infections under careful precautions — hospitalization — properly adjusted and supervised wet dressings and particularly in the acute spreading infections a principle of watchful waiting.

Dr. John W. Powers discussed "The Treatment of Compound Fractures and Contaminated Wounds." Compound fractures have long been a problem in treatment. Infection is often the cause of osteomyelitis, nonunion and lengthened disability. Therefore, it is immediately proposed in this discussion to emphasize the principle of a reduction of compound fractures to simple fractures. The wound should be treated during the first four or five hours to secure the best results; a change should be made from compound to simple fractures in eight to 10 days after the injury. Serious consideration should be given to the use of antitetanic and gas serum. Cleansing of the wound may well be done with green soap by scrubbing and frequent rinsing with sterile water. All recesses of the wound should be scrubbed for a period of 40 to 45 minutes, changing gloves at 20 minute intervals. Only a partial debridement should be done. Haematomata should be incised when the wound has been thoroughly cleaned. Ether may be used for grease removal. When properly cleansed the wound should be filled with vaseline and closed. A window may be left over the wound if found necessary. The temperature should be watched and if there is a moderate fever one should wait. Inspection of the suture should be made for leaking of vaseline. After healing has occurred the fracture then may be treated. The author was against the use of strong antiseptics because of the coagulation and subsequent necrosis of tissue. In concluding, it is believed that the treatment of compound fractures and contaminated wounds may be simplified by early closure. Contamination does not occur until four or five hours have passed as the usual thing. The wound should, therefore be properly cleansed and closed and later the fracture may be adequately treated The use of strong antiseptics in fresh wounds is contra-indicated.

July 28—Afternoon Session

Dr. ARTHUR G. SULLIVAN, Chairman of the meeting, first stated that the medical profession must not rest content with the advances made in 25 years but must definitely adopt a very progressive attitude toward certain problems, among them the following: the loss of shoulders that are not injured themselves but become useless because of the treatment of injuries of other parts; the increased mortality due to lockjaw because of not using tetanus antitoxin; the high mortality from head injuries because of extradural hemorrhage or depressed fractures; undiagnosed and overlooked peripheral nerve injuries; disability due to prolonged splinting of fractures; use of prolonged diathermy when early employment would be better; the especial value of rehabilitation measures, notably the use of workers on part time after rehabilitation or during rehabilitation; the unwarranted support by physicians of dishonorable claims; the support of unwarranted claims for pneumonia, lead poisoning, cancer and other diseases; the failure of the physician to realize that the employee sacrifices approximately 30% of his wages for each day of continuous absence from work; and the great need for physicians to obtain adequate information as to what the standards of the commission are and as to what the compensation law really is.

At this point in the meeting, Dr. Burns, of St. Paul, especially thanked Mr. Kuechle for the very fine program which had been arranged, and gave a special invitation to the group to attend the 1936 session of the Interstate Post Graduate Association.

Dr. J. Albert Key discussed the subject "Internal Derangements of the Knee Joint." The term "internal derangement of the knee joint" has been loosely applied, but should be limited especially to structures within the joint, which however may include tears of lateral ligaments. There are two general types of cases, acute and chronic. In the acute type of injury, all the various structures of the joint may be affected. It is first necessary to determine if there has been any previous injury and then to determine the mechanics of the present injury. Especially valuable is to determine the occurrence of swelling and the limitation of motion, as well as the character and occurrence of pain. The age and activity are important points. It is well to examine both knees and to look for the usual external evidences of injury, noting especially the contour and position of the various parts. Localization of pain is quite important, as well as localization of tenderness and tests for fluid. Tests should also be made for voluntary movement and for stability. An x-ray photograph should be taken in every instance unless the physician is well assured of the case under consideration having only a mild injury. The treatment should be conservative. Fluid may be withdrawn. In some instances it is well to use a plaster cast with the leg drawn toward the injured side of

the torn ligaments for three weeks. If there has been no tear, an elastic bandage can be applied after aspiration of fluid. In cases of locked knees, it is wise to try unlocking the cartilage; an anesthetic may be necessary, but usually if one cannot reduce the locking without an anesthetic, it cannot be reduced by the use of an anesthetic. Formerly the essayist used plaster casts for six weeks but now the use of adhesive plaster plus an elastic bandage for support seems to give results and later if operation is necessary the muscles are in much better condition. In acute injuries when the spine of the tibia is torn off, operation is justified. Chronic cases may affect the crucial or semilunar ligaments and may involve the production of loose bodies in the joints or may show the effects of contusion. One should certainly consider if the instability of the joint is dangerous to life, either through the occupation or the habits of the person involved. Arthritic changes often occur in chronic knee joints. The operation must be well considered in such cases and special training is necessary. Furthermore, the operation must be done without undue trauma. Conservative treatment usually gives the best results, making use of rest, support and proper exercises. In postoperative care a pressure bandage should be properly adjusted to avoid impediment to the circulation. Such patients can usually be about with a cane in 10 days.

Dr. George R. Dunn, discussing Dr. Key's paper, believes that operations of this type should be done with great care and should be preceded by a detailed history, careful examination and x-ray photographs properly interpreted. A special detailed description of a test for so-called "cartilage thrust" was given. Especially emphasis was placed by Dr. Dunn on the proper sterilization of instruments.

Dr. Norbert Enzer, in presenting the subject "Laboratory Aids in Industrial Medicine and Surgery," first called attention to a series of defects and errors in industrial practice and stated that he would demonstrate some of the peculiarities by case records and histories. One of the principles involved in demonstrating these cases of defects or difficulties is that all phenomena should be studied in regard to cause and effect. A series of lantern slides was then shown illustrating these principles. One case was that of an infection of bone from a third amputation subsequent to which there was found by pathological examination an endarceritis obliterans which suggested lues. A Wassermann confirmed this. Another case was the occurrence of a tumor mass of the sterno-cleido-mastoid muscle. A piece of the muscle showed histologic changes characteristic of tuberculosis or lues and a Wassermann proved the diagnosis. The speaker favored the Kline test rather than the Wassermann or the Kahn because of the fact that the test can be very simply done in about 20 minutes time. In comparative results the Kline is just as accurate and in some instances more accurate than the other tests. A plea was made not to throw away samples of serous fluids which are withdrawn from patients—they should always be tested, particularly the sediment, in one instance evidence of a metastatic carcinoma was found in such fluid. Ordinarily the histology of a hernial sac is not considered to be very important, but in one instance a metastatic colloid carcinoma was found and in two other instances evidence of tuberculosis. In a long-standing case of ulcer of the leg a squamous cell carcinoma was found. In tumors of the skin mistakes are very often made, as for instance, a case of a wart on the foot in which dissection showed a melanoblastoma; six weeks later at autopsy metastases were shown in the brain. In an x-ray photograph of the bone a tumor of the bone was evident which later proved to be a case of metastatic hypernephroma. A skin section of the foot showed a previous injury but without infection; however the patient had multiple kidney abscesses and also multiple abscesses of the prostate, there being no connection between the skin injury and the abscesses. In the instance of a chemical skin rash which was supposedly allergic the patient subsequently developed intense headaches and anuria; subsequent section of the kidney showed the presence of a subacute glomerular nephritis. In a similar case after an injury to the back, fever and chills occurred with haematuria. Section finally proved that this was a case of acute haemorrhagic nephritis. In a gall bladder operation the postmortem examination did not show sufficient change in the gall bladder to explain the reason for death; a coronary thrombosis, however, was found. More emphasis should be placed on postmortem examinations and the attendance of them by physicians and surgeons. Furthermore, the laboratory should be used a great deal more in checking up the findings of the clinical aspects of medical and surgical cases resulting from industrial sources.

Dr. Robert E. Burns presented the final number on the program, entitled "Some Reflections on Bad Results." It should be remembered that surgical procedures may accomplish good results for a long period of time and then suddenly poor results may occur. The best way to overcome this difficulty is to anticipate poor results. The hand has no biologic counterpart in the lower animals, and the thumb is the most valuable part of the hand. Fractures of the carpal scaphoid are frequently missed, and are often missed even on the x-ray photograph. The carpal bones possess no periosteum and callus therefore does not appear prominently. There is no rule of thumb as to when union occurs. The dislocation of the carpal semilunar is particularly of importance with regard to future disability which may appear without cause. The characteristic appearance is often missed and the author strongly advised the use of both A.P. and lateral views where this injury is suspected. In cases of Colles' fracture frequently volar flexion for a period of over one week produces deformity in itself, and may have crippling results, at least temporarily. In shoulder injuries the possibility of contractures should always be considered. In fractures of the clavicle open operation should not be done unless it is very certainly indicated. There are many cases of malunion of the upper end of the femur seen and possibly this may be because weight-bearing is permitted too soon. In comminuted fractures of the patella adequate treatment may be obtained by the closed method. In spiral fractures of the lower tibia there is often an accompanying fracture of the upper portion of the fibula which is missed. In Potts fractures failure to close the mortis at the ankle joint is often noted—this can be done by the compression of the malleoli; the creation of a pes equinus is

also noted frequently and should be prevented by care in checking the position of the foot at proper intervals. The way to obviate these difficulties is to study carefully the end results which will permit of the development of proper surgical judgment. A series of slides was then shown demonstrating a fracture of the semilunar and a series of dislocations. Another case was demonstrated of the removal of small pieces of bone and a resulting stiff hand. In a case of fracture of the elbow an ischemic paralysis was produced. Emphasis was placed particularly on the "push and pull" x-ray in demonstrating nonunion of the femur. Other slides were shown demonstrating the abuse of plate, bands and screws.

Crushed Limbs

The Time to Amputate

By THOMAS H. HANCOCK, M.D.,
Atlanta, Georgia

SOME of us remember when it was the accepted procedure to wait until shock had subsided before performing these operations,* and this theory was advocated in 1892 at the New York Polyclinic Hospital—the first postgraduate place of medical instruction in the United States, if not in the world; founded by Prof. John A. Wyeth. Shock, we were taught, was produced by several causes, hemorrhage, fright, grief, etc., but the nerve injury was not mentioned. A while ago I read an account of a grandfather, who, finding his grandson dead, fell dead himself. It is a well known fact that when a very old person dies, the mate seldom survives very long.

Let us go back a few years and review the treatment of shock or for preventing its occurrence. Brandy and black coffee were injected into the rectum, but were seldom retained long enough for much absorption, and I have seen failures many times from their use. Caffeine or camphor may be useful in some diseases, but are useless in surgical shock. The action of strychnine is too slow, yet some of our best men continue to use it. Tap water made lukewarm is taken up more rapidly in the rectum than the normal saline solution. It is well to lower the head of the table and insert six ounces only, as larger amounts are not apt to be retained. The normal saline solution with glucose is now on the market, and needs only to be warmed before it is used. Our procedure is practically as follows: first, see that the tourniquet controls the hemorrhage, commence the ether, giving it very slowly and with plenty of air, give hypodermically morphine sulphate gr. ⅛, no more, atropine sulphate gr. 1/200, and adrenalin mms. 10. I have seen 5 mms. of adrenalin given to a small woman produce alarming effects, but the large majority of our crushed injuries occur in men, and it is perfectly safe to give the average man 10 mms. If shock is marked, we give 500 cc. of the normal saline solution in a vein, and I have given 800 cc. with recovery. Heat has not been stressed as it should have been—not by having the operating room so hot that the operators are uncomfortable, as the patient needs all the oxygen contained in ordinary air at a comfortable temperature. If electric pads are not at hand, hot water bags or even heated bricks protected with paper and blankets are useful. Speed is of the greatest importance, and when two limbs are crushed it is best to have two surgeons. I once amputated an arm in eight minutes and 20 seconds, and a thigh in 17 minutes, and both recovered.

Ether, given slowly with plenty of air, is a stimulant, and it is evidently the safest anesthetic. I believe there have been more deaths from gas-oxygen than from ether and chloroform combined. I am partial to chloroform in many cases, if given by an expert, but not in cases where we expect shock, and it should be switched to ether whenever the patient begins to struggle. Most of the deaths from chloroform have occurred at this stage—usually called the period of excitement, but should be called the period of suffocation. The late Dr. Gordon of Dalton, Georgia, once said that he believed that it was given to Adam by God in the Garden of Eden when he put him to sleep to remove a rib for the construction of Mother Eve. It must be given with plenty of air—the Hyderabad Commission reported to the British Government in 1888 that it must not be stronger than 6% to be safe. The mask should never be put against the face and should be removed each time the chloroform is applied, to preclude the possibility of getting it in the patient's eyes. Soon after this report the ACE mixture was employed to cut down the percentage of chloroform, but I found that it was easier to dilute the chloroform with air. I see my train has gotten off the track and I am getting away from my subject. Chloroform should never be given in the cases I am supposed to be discussing.

In the first hip joint amputation I performed I lost valuable time removing the head of the femur from the acetabulum instead of sawing through the neck of the femur, as I did in the other two. We did two high thigh amputations, two of us operating as fast as we could. All five recovered, in fact all of my hip joint amputations recovered, and I do not recall the death of any of the double thigh amputations that we did. I reported these cases to Prof. Wyeth, as his bloodless hip joint amputation method made it possible for these three to be performed, and he told his succeeding classes for many years that I was right in performing the operations before shock was established. Some of these cases will be in extremis and no operation can save them. I recall a case where a switchman had been run over, one thigh was crushed so that a hip joint amputation could have been made, but the other was mashed through the pelvis. It was readily seen, and I told him that he had a very short time to live. He did not have enough circulation for morphine to be absorbed, and ether was begun the moment he entered the hospital—just enough to ease his pain, and it was continued till he died. Later I was asked to tell how long he suffered, but I was not called to testify in court as a satisfactory settlement was effected.

It is with pardonable pride that I report a case where a man suffered a crushed leg and thigh. He had been in another hospital 48 hours, had been given a blood transfusion, and it had been decided that he could not stand a high thigh amputation. We gave him a saline and glucose transfusion 500 cc., moderate ether anesthesia, and this was the case in which I did the high thigh amputation in 17 minutes. He is now keeping books for a large firm in Atlanta.

* Presented at the Thirty-Ninth Annual Meeting of the Association of Surgeons of the Southern Railway System, Knoxville, Tenn., June 16-18, 1936.

The History of Industrial Medicine and Occupational Diseases

—A Historical Outline of Occupational Diseases, Industrial Hygiene and Surgery, Traced from Early Antiquity to the Great Depression of the Twentieth Century—

by

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The Birth of Modern Industrial Medicine

THE impetus to learning, discovery, and invention that the Renaissance gave the seventeenth century continued by leaps and bounds and culminated in the latter part of the eighteenth century with the invention of the steam engine. The application of steam power, the birth of modern industrialism, created the modern factory, expanded transportation facilities, produced urban life, with all its difficulties, introduced child labor, developed public health and factory legislation, and as an outcome, occupational hygiene and industrial medicine became an entity in the field of preventive and curative medicine.

Ramazzini's book, DISEASES OF TRADESMEN, was translated into English in 1705, German in 1735, and into French in 1777, having altogether 20 editions and translations. The expansion of industry was rapidly developing and this book had a marked effect on the medical profession generally, as a guide to observe the signs and symptoms of disease among workers and toilers.

"What trade does he pursue?" is the immortal question that Ramazzini offered in his advice to physicians on first seeing a patient, and this question is of the utmost importance today. This astute clinician called attention to the prevalence of consumption in dusty trades, among miners, potters, and steel workers. The prevalence of this malady inspired Thomas Benson, of Newcastle, England, to secure in 1713 a patent for a wet process in grinding flints—an early attempt at dusty trade preventive work.

In 1712 E. Kaemfer describes a dermatitis from lacquer varnish, placing dermatology in the occupational disease group. Goschavitz in 1721 describes in his work, DE SPADONE HIPPOCRATICO HALLE, "that the prevalence of phthisis was noted among quarrymen." J. J. Weppler in 1727 notes it among stone cutters and grinders.

Investigators continued to add to the knowledge of the toxic effects of lead, the metal that from Hippocrates' time down through the ages has caused more morbidity than any other occupational factor.

John Huxham (1692-1768), of Totnes, Devon, in 1724 described the Devonshire colic very vividly: —"the vomiting, the hard-like abdomen which did not respond to the most drastic purges and clysters, griping pains, paralysis of hands, convulsions and delirium" (Published in OBSERVATIONS ON AIR AND EPIDEMIC DISEASES, 1759). Huxham was one of Boerhaave's pupils who, in 1739, observed Devonshire colic among cider drinkers without determining that the true cause was due to lead.

It remained for Sir George Baker (1722-1809) another Devonshire physician, to determine that the sheet lead in the cider vats and presses was the real cause of the poisoning that produced Devonshire colic. He was able to recover lead from the cider. His paper on this investigation won him his baronetcy. His inquiry concerning the cause of the endemical colic of Devonshire was published in 1767. *The Medical Transactions of the Royal College of Physicians*, the first English medical journal published in London in 1768, contains another original paper "Examination of several means by which the poison of lead may be supposed frequently to gain admittance into the human body, unobserved and unsuspected."

Theodore Trochin, a native of Genoa and another of Boerhaave's pupils, later professor of medicine at Geneva, noted in his book, DE COLICA PICTONUM, (1757), that among potters, where lead was used as a glaze, nausea, vomiting, griping colicky pain in the region of the umbilicus, and palsy of the hands were experienced. He also reported some cases of colic following the drinking of wine which had been sweetened by lead, and the drinking of water poisoned from passing through gutters from lead-covered roofs.

Thomas Cadwalader (1708-1779), an American, made some important studies on the West Indian gripes (lead poisoning) caused by distilling rum through leaden pipes, which were published by Benjamin Franklin at Philadelphia in 1745.

John Fothergill, 1712-1780, a pupil of the first Munro, a successful London physician, among his collection of medical papers made observations of disorders of painters of water colors which deal with lead poisoning (*Colic Pictonum*).

In 1780 Guyton De Morveau also stressed the danger of industrial lead poisoning. In the same year Philbert Chabert published a memoir on animal anthrax.

The great Amsterdam physician, Herman Boerhaave, is credited with making probably the first animal experimentation with carbon monoxide

gas in 1722, about the time that he wrote his famous text book, ELEMENTA CHEMISE. This observer had already in 1709 described heat stroke as "isolation," a condition common today among foundry and asphalt workers.

Jena Fred Henckel published his book, PYRITOLOGIE, in Paris in 1760 in which the second part was devoted to diseases of miners and foundrymen.

While scurvy is a deficiency disease, from the time of Hippocrates down it has been considered a seaman's malady. This scourge, which regularly killed entire crews, became lessened and controlled through the observation of an Edinburgh naval physician, Sir James Lind, 1716-1794, who published his first book on scurvy in 1753. To him must be given the credit for the prevention of this disease by dietary methods, using animal and vegetable foods in combination with oranges and lemons. His work in naval hygiene and tropical medicine won for him the title of the "Father of Nautical Medicine". Bland standardized the rationing of lemon juice against scurvy in the Royal Navy of England. Poissonnur-Desperrierers published an early book at Paris, 1767, of diseases of men who follow the sea.

Sager in 1765 called attention to the fact that the "foot and mouth disease" in cattle was transmitted to man.

Desault in 1766 introduced his famous bandage for fractures.

Percival Potts, 1714-1788, that famous London surgeon whose name is associated with the fracture of the fibula and spinal caries, wrote in 1775 a masterpiece on chimney sweeps' cancer. He asserted that this form of scrotal cancer was due to some tumor-exciting substance in the soot.

The Chimney Sweepers Act of 1788 was motivated by Potts' account of chimney-sweeps' (scrotal) cancer, 1775, which set forth the misery and virtual slavery of the poor "chimney boys", and was followed by Jonas Hanway's SENTIMENTAL HISTORY OF CHIMNEY SWEEPERS, 1785. Yet, in spite of Lord Ashley's Acts of 1834 and 1840, a child of seven and a half years was lifted into a chimney in 1873; and the mortality from cancer, according to T. M. Legge, was still high in 1902.

Several published works on occupational diseases appeared in the last half of the century. Hecquet's DICTIONARY OF HEALTH was published in 1740. Dr. Skragge, of Upsala, in 1764 wrote his THESIS ON MALADIES OF CRAFTSMEN. Dr. Buchanan referred to workers' diseases in his DOMESTIC MEDICINE (1775). He recommended a suitable diet for sailors and advised specially constructed tables for sedentary workers, to correct faulty posture. He also pleaded for workers' gardens and other means to give them proper exercise. The Academy of Medicine of France in 1779 published many articles on occupational injuries and diseases. The Annals of State Medicine was instituted in Germany in 1782, which contributed largely to this subject.

The evolution of heating, ventilating, and illuminating was slow and unscientific from the open fires in caves to the open braziers and hypocausts of the Greeks and Romans and down through the ages to the porcelain stoves of the Scandinavians in the ninth century.

The seventeenth century produced Robert Boyle, 1660, who proved that air was essential to life and combustion. Robert Hooke, in 1667, demonstrated that respiration is affected by blood changes in the lung. John Marlow, in 1668, theorized as to the chemical nature of blood changes in respiration, and Richard Lower in 1669 oxygenated venous blood.

These physiologists paved the way for the understanding of respiration which led to the marvelous progress in the eighteenth century in the knowledge of air chemistry. Joseph Black, in 1757, discovered carbon dioxide. Priestly and Scheele, in 1771, jointly isolated oxygen. Rutherford, in 1772, discovered nitrogen, and Lavoisier, in 1775, discovered oxygen and the interchange in the lungs.

These researches added to the scientific knowledge necessary to understand modern heating, ventilating, and illumination, and gave the impetus for the invention of industrial furnaces, gas illumination, steam and hot air heating.

The first authentic book on ventilation was published in London in 1743, A DESCRIPTION OF VENTILATION, written by Stephen Hales. This followed G. D. Fahrenheit's invention of the 212° mercury thermometer in 1714.

Wm. Murdock, of England, introduced gas lighting in 1782. The next step was taken in 1784 when Argand developed the wick and the glass lamp chimney, and the candle age of illumination passed its last milestone.

The knowledge acquired through the researches of these early investigators made possible the understanding of factory and mine hygiene.

Sir John Pringle, in his book, OBSERVATIONS ON DISEASES OF THE BRITISH ARMY, published in 1752, regarded "putrefaction of air as being of all the causes of sickness perhaps the most fatal and least understood." He advocated a ventilation apparatus, a bellows for alternate exhaustion and propulsion of air invented by Dr. Stephen Hales of England, a pioneer in ventilation.

In 1769 anthrax gained the proportions of a plague, and a scientific study was proposed by the Academy of Dijon, France, which offered a prize for essays on the subject, resulting in some remarkable and accurate descriptions of the symptoms of human anthrax and the anthrax of animals. Fournier of Dijon published his invaluable work CHARBON MALIN at this time. In 1780 Philbert Chabert was able to differentiate the form of anthrax in man from other septic conditions of the skin. This was the start of proving the contagious nature of the diseases in animals, which honor fell to Barthelemy in 1823.

Throughout the eighteenth century agricultural workers were falling ill with pellagra. Gaspar Casal, a Spanish Physician, gave the first account of this disease in 1762 and called it "mal de la rosa". Francis de Frappoli, an Italian, in 1772 gave it its present name. Four years later, another Italian, Piettro Verra, instituted at Milan the Societa Patriattica which inspired a movement to aid sufferers from pellagra and from other occupational diseases among lead, wool and silk workers. It remained, however, for Marzari, in 1810, to attribute pellagra to corn. At Legnano, Italy, in 1784, was opened one of the earliest clinics for workers suffering from this disease.

About this same period outstanding observations were made in occupational dermatology: argyria by Zallner in 1795, dermatitis from mercury by J. Bell in 1796, and in 1798 on skin diseases of metal workers, and grocers' itch in bakers.

shoemakers, and grocers, by Robert Wellan, the English dermatologist. M. Merat, of Paris, de la Colique Metallique, collected at the Hospital La Charatie 279 cases of lead poisoning between 1776 and 1811—of this number 241 were artisans of different trades with a death rate of 15. This investigator noted at postmortem the contraction of the large intestine.

Conditions in the congested urban factory centers of England were becoming intolerable and were instrumental in the organizing of a voluntary society named the Manchester Board of Health, by Drs. Percival, Rerrier, et al, in 1796, to deal with factory hygiene and bring to the attention of the authorities in Manchester and Parliament the urgent need of reform and regulation.

These investigators laid before the public the state of the factory children, pointed out the peculiar contagious fever found among them in the cotton factories. They stressed the debilitating effect of close confinement in hot and impure air together with the long hours of labor. These contributing factors impaired the strength and destroyed the vital stamina of the rising generation and also debarred them from educational opportunities. Undoubtedly as a consequency of these and other revelations Sir Robert Peel had a bill passed in 1802, known as the "Health and Morals of Apprentices" Act.

In 1779 measures were being agitated in Italy by J. P. Frank to protect the working women before and after childbirth. Their aim was to liberate these women toilers for a period of three months before delivery.

Wm. Wilberforce in 1788 was supported in the House of Commons by Pitt, Fox, and Burke in proposing resolutions for the abolition of the Slave Trade. These resolutions eventually brought about the Abolition Bill in 1807, forbidding trading in slaves. In 1833 a law was passed whereby the holding of slaves in the British Dominions was forbidden, thus forever abolishing slave labor.

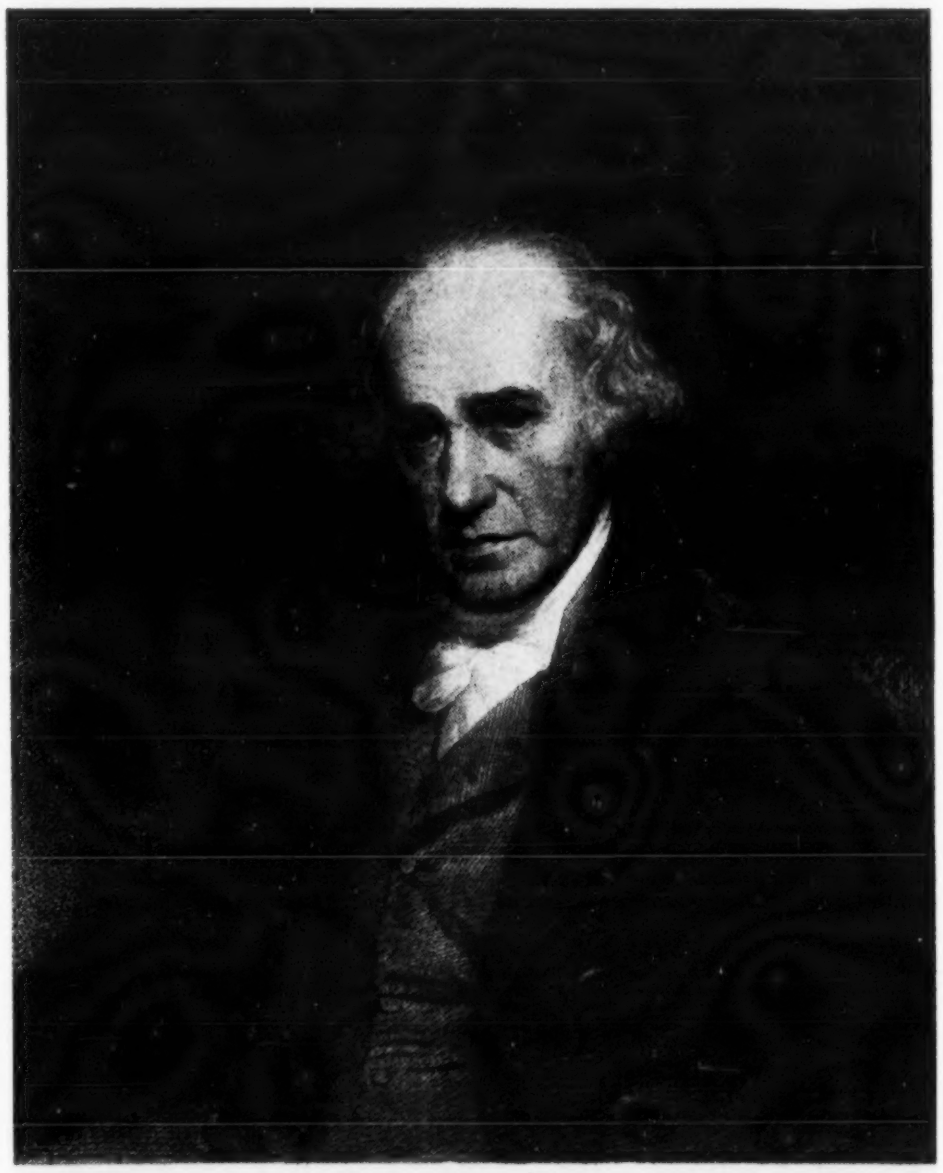
James Watt

JAMES WATT, a Scottish engineer, invented the steam engine in 1769, and thereby revolutionized industry. This was the greatest development in power production and the beginning of the modern factory. The introduction of steam power gave England precedence over all other countries in the eighteenth century in the field of industrialism. It was the beginning of urban life and as a direct result many problems in public health and industrial hygiene arose.

James Watt (1736-1819) was not the inventor of the steam engine but wrought such comprehensive improvements in it that he has rightfully been acclaimed the "Father of Steam Locomotion." Born at Greenock, Scotland, James Watt was educated at the public schools. When eighteen years old, he went to Glasgow to study to be an instrument maker, and finished his apprenticeship in London. Returning to Glasgow, he received a position as instrument maker at the University, where his contacts with many professors gave him valuable instruction. In 1760 he established himself independently, and as early as 1759 turned his attention toward the development of a steam carriage.

In 1764, called upon to repair the model of the Newcomen engine at the University, he became aware of its inefficiency and set himself to rectify it. In 1774, in partnership with Matthew Boulton, he completed a steam engine which caused Parliment to pass a special act extending his patent until 1800.

With the many improvements and additions to the steam engine made by him, one is made aware of the diversity of his researches and the breadth of his talent. Retiring from business in 1760 he



JAMES WATT

turned over to his two sons his interest in the large and remunerative business which had been built up in Soho. He died at Healthfield in Staffordshire in August of 1819. He was elected a fellow of the Royal Society of Edinburgh in 1784, of the Royal Society in London in 1785, and made a foreign member of the Institute of France in 1808. The University of Glasgow conferred on him the degree of Ll.D. in 1808. His name has been given also to that unit by which power is calculated.

The spinning jenny was invented by High Kay and Hargraves in 1767, supplemented by the Arkwright spinning machine in 1771, and Cartwright's power loom in 1785. This laid the foundation for the textile industry on a large scale.

The first cotton mill in the new world was established in Rhode Island in 1770, and the cotton gin was invented by Eli Whitney, an American, in 1792.

George Stephenson, an Englishman, invented the steam locomotive in 1825, and Robert Fulton, an American, invented the steamship in 1807, when the Claremont made its successful trial trip on the Hudson River. These two wonderful inventions were powerful influences in the development of modern civilization. They opened up new coun-

tries, perfected rapid transportation, developed commerce, cheapened raw material, advanced new inventions, and created the industrial world.

The advent of the industrial world and the machine age brought its toll in morbidity and mortality, not only an increase in communicable diseases due to over-crowded factory towns, but also occupational diseases from handling metals, inhaling fumes and dusts, and accidents that are common in trades and transportation.

Coal began to be used in iron smelting in the seventeenth century, but the invention of the steam engine gave a great impetus to coal mining for steam fuel. This hazardous trade was the cause of many occupational diseases and accidents; the coal dust, a cause of anthracosis; and the deadly, suffocating and explosive gases, such as CO, CH_4, CO_2, and H_2S. Mine ventilation advanced from the heated-up shaft to the motor driven fans for air circulation.

The dangers of coal mining stimulated safety measures, and caused the introduction of the safety lamp, invented by Sir Humphry Davy. A. von Humbolt, in 1799, described choke damp and fire damp, two hazardous gases in coal mining. He devised a gas mask and a safety lamp.

John Dalton in 1794 first described the color blindness which today causes the rejection of applicants as unfit for jobs in the railroad and marine services.

The closing of the eighteenth century heralded one of the foremost triumphs in the science of preventive medicine—the discovery of inoculation for the prevention of smallpox by Edward Jenner, of Gloucestershire, England, in 1796. The smallpox epidemics in army and labor camps were conquered, the horrors of this disease among the population of the civilized world were eliminated, and the new science of immunity was born.

Anatomy and chemistry progressed. In England and Scotland surgery was being perfected by Pott, Hunter, Cheselden, Abernethy, and Bell. Great hospitals and medical schools were erected, and medical practice generally made big advancements.

In 1799 T. Beddoes noted in an essay that millers and others working in organic dusts are not predisposed to tuberculosis.

With the end of the Revolutionary War in America, 1775-83, a new country was established with a people who possessed initiative and inventive ability. This land, won by the colonists, had a climate and geography suitable for the white man, and an adundance of raw material which eventually caused America to become the greatest industrial country of the world.

The Nineteenth Century—Industrial Hygiene and Medicine

WITH the ushering in of the nineteenth century and the rise of industrialism, the development of the biological and chemical sciences made possible more progress in the study of occupational diseases and surgery than had been accomplished in the preceding centuries since the dawn of history.

C. T. Thackrah, of Leeds, in 1832, may be quoted as exemplifying the benevolent attitude of nineteenth-century medicine toward occupational disease prevention: ". . . a study of medicine, moreover, which disregards the prevention of disease, limits its utility and its honours. It would strip the profession of its noblest attribute, that of benevolence, and exhibit our practice as influenced more by personal and pecuniary motives than by an anxiety to relieve human suffering and promote human happiness."

It was indeed necessary that such interest be taken. In England, as the result of the invention of the power looms and the development of urban industrial centers, disease caused by unsanitary conditions, child labor, overcrowding, and long hours of labor was greatly increased. It is stated that as late as 1833, the average age of longevity of the laboring classes was only 22, as compared with 44 for the upper classes. Later, the death-rate in the laboring districts reached 36 per thousand per annum, while that for the country as a whole was only 22 per thousand. When we compare this mortality rate with that of 10.8 for the registrated area of the United States in 1933, it gives an idea of the progress that has been made in preventive and curative medicine since that time.

The first Factory Act in England, the Peel Act of 1802, dealt with the health and morals of apprentices and others employed in the mills and factories. Although concerned with the restriction of the hours of work for children, it omitted the large number of minors who were not apprentices. For sanitation the Act provided that the rooms of the factory were to be washed with quick lime twice yearly. No night work was to be permitted. The hours of work were restricted to not more than 12 a day. On week days the apprentices were to be instructed in reading, writing, and arithmetic, while on Sundays they were to receive religious instruction. The factories were to be visited regularly by a justice of the peace and a clergyman.

In 1816 Sir Robert Peel proposed to Parliament that it inquire into the conditions of the factory population, and limit the age at which children should be admitted to work in the factories.

Robert Owen, a benevolent employer of the period, championed an agitation to amend the Peel Act. "We manufacturers," he wrote, "are always perfecting our dead machinery, but of our living machinery we are taking no care!"

Combined agitation from many sources, and the miserable condition of the working men eventually led to the Reform Bill of 1832. This almost immediately produced three other measures. The Factory Act of 1833 was inaugurated by Lord Ashley in an attempt at industrial and social reform. It established factory inspection and restricted the hours of labor to eight hours for children under 13 years of age, and to 12 hours for girls under 18. Secondly, the Poor Law Amendment of 1834, inspired by Edwin Chadwick, put an end to the systematic abuse of poor law relief, and set up the ill-fated but extremely valuable Poor Law Commission, the first central board concerned with public health, directed primarily to the poor, but applicable in the long run to all. In 1835 came the Municipal Corporations Act, which readjusted the administrative areas of the boroughs, provided for elected corporations in place of cooperative municipalities, and strengthened local government authority. From these three acts was to grow, by extension, almost the whole of the modern statutory services in behalf of the health of the people. These social reforms in industrial life promoted the new knowledge of preventive medicine.

In France, exhaustive investigations were made into working conditions of wage earners by the "Academie des Sciences Morales et Politiques de France" in 1839. This gave a decided impetus to factory legislation.

In 1842 Edwin Chadwick and his medical colleagues produced their memorable *General Report on the Sanitary Conditions of the Laboring Population of Great Britain.* This work dealt with the social and sanitary conditions, which they had thoroughly investigated, the comparative chances of life in different classes of the community, the pecuniary burdens created by the neglect of sanitary measures, and the evidences of the value of preventive medicine. Measures to reform conditions were also suggested.

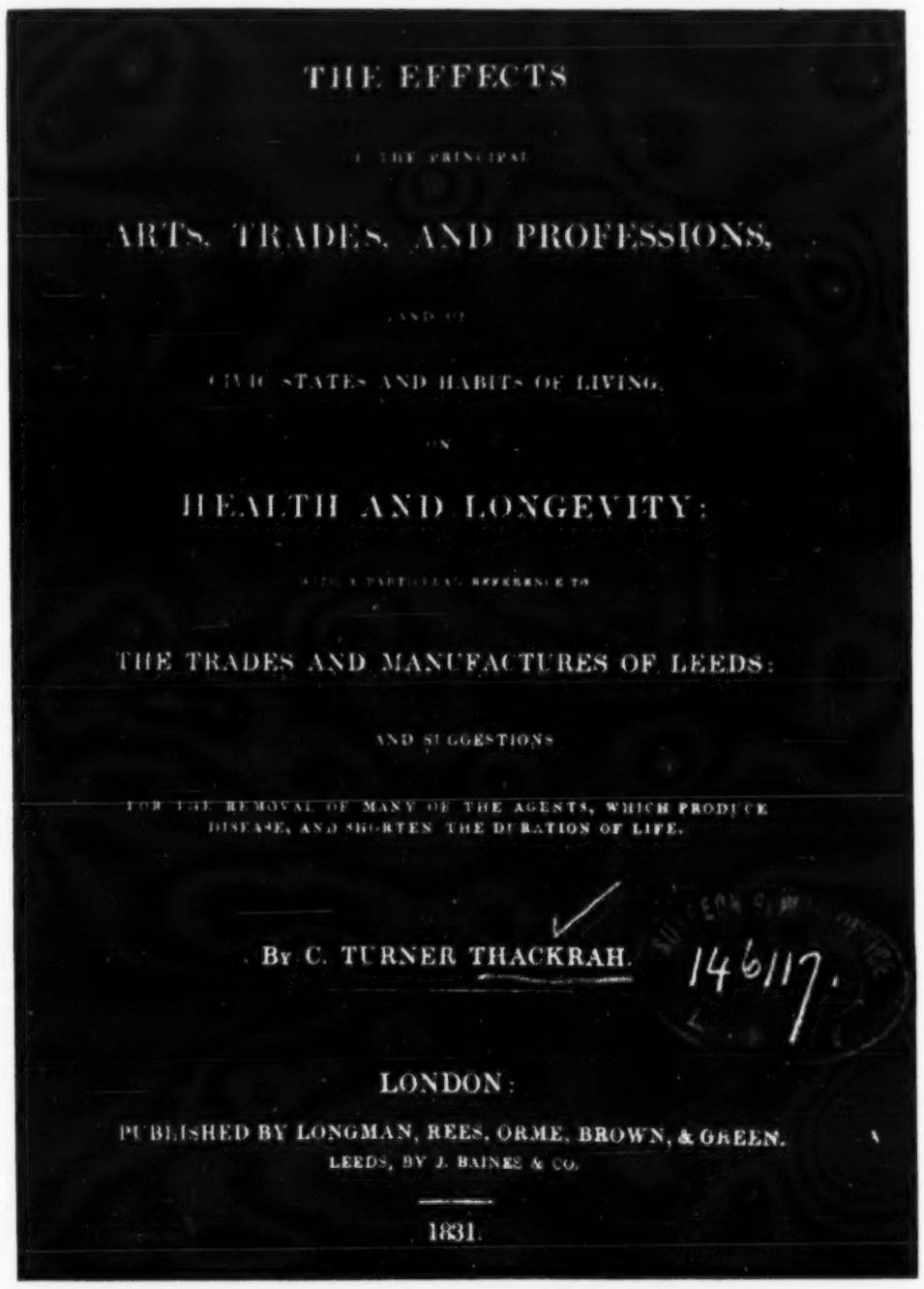
In the meantime important events were occurring in inventive and medical lines. In 1807 England passed an act abolishing the slave trade. In 1815, the eventful year of the Battle of Waterloo, Sir Humphrey Davy invented the miner's safety lamp, and Laennec, of Paris, discovered mediate auscultation. When C. Turner Thackrah, of Leeds, was publishing his famous book on trade diseases in 1831, the anaesthetic and solvent, chloroform, was being discovered by Liebig, Guthrie, and Soubeiran. During the same period Kay, of Manchester, reported on the sanitary status of the cotton spinners. James Marsh introduced in 1836 the test for arsenic. R. Bright soon after described acute yellow atrophy of the liver, a pathological condition common as a result of toxic industrial solvents.

As invention and industry increased, a number of new trades were brought within the scope of the Factory Acts. Reports on the causes of diseases in these trades were published by the medical officer of the Privy Council, in an effort to spread knowledge which would aid in their prevention. Legislative enactments soon provided for mechanical ventilation in dusty trades, compulsory notification of certain dangerous occupational diseases, limitation of hours. and the appointment of factory inspectors and certifying surgeons.

As interest in the field of dusty trades was stimulated, many contributions were published that have led to our present knowledge of pneumonoconiosis. L. Descap, of Strasburg, in 1813, had been one of the first to report anthracosis in coal miners, and Breschet, in 1821, reported melanosis, a black infiltration of the lung. In 1862, A. Tardieu, of Paris, made a study of phthisis with relation to cotton dust. In 1865 F. A. Zenker. a German, declared that tobacco dust infected the lung. In the year 1869 two significant reports were published: that of F. Meinel, of Erlangen, on chalicosis, and that of E. H. Greenhow, of London, on the pathology of the pearl shell cutter's lung. A. Fiel published a report on asbestosis in asbestos workers in 1872.

As America and the continental states profited by the laws, investigations, and knowledge of industrial diseases that England acquired, they were quick to adopt the English methods and improvements. They now became concerned with the study and prevention of occupational diseases, and especially the protection of the working man from industrial accidents. This interest finally led to the modern Workmen's Compensation Acts.

The physical and chemical sciences were developing by leaps and bounds in the nineteenth century. Each new discovery in these fields that would aid industry was eagerly commercialized by the industrialist; and each new innovation brought about almost invariably a new occupational hazard which had to be mastered by medical and hygienic measures. To meet this situation the industrial physician and hygienist came into existence.


THE EFFECTS

OF THE PRINCIPAL

ARTS, TRADES, AND PROFESSIONS,

AND OF

CIVIC STATES AND HABITS OF LIVING,

ON

HEALTH AND LONGEVITY:

WITH A PARTICULAR REFERENCE TO

THE TRADES AND MANUFACTURES OF LEEDS:

AND SUGGESTIONS

FOR THE REMOVAL OF MANY OF THE AGENTS, WHICH PRODUCE DISEASE, AND SHORTEN THE DURATION OF LIFE.

By C. TURNER THACKRAH.

146117.

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1831.

During the period from 1840 to 1860 much progress was made in the fields of medicine and chemistry with relation to industrial hygiene. Medical schools and laboratories in the basic medical sciences were being established. Scientific societies were stimulating investigation and discovery, and the culmination was the most important discovery yet made in scientific medicine and public health—the discovery of the bacterial cause of disease by Louis Pasteur, of France.

A review of the more important events of this period might be of interest here. Long, of Georgia, operated with ether anaesthesia in 1842, and in 1843 Dubini of Milan discovered ankylostoma duodenale. Langenbeck discovered actinomyces in 1845. Morton, the Boston dentist, introduced ether anaesthesia in 1846 at the Massachusetts General Hospital. J. Y. Simpson, of Edinburgh, in 1847. introduced chloroform anaesthesia in obstetrics, and the same year the immortal I. P. Semmelweis, of Vienna, discovered the pathogenesis of puerperal fever which likewise was independently observed by Oliver Wendell Holmes. Claude Bernard, of Paris, in 1848, discovered the glycogenic function of the liver, an important factor in industrial fatigue. Two French observers, Rayer and Davaine, discovered the anthrax bac-

cillus, cause of wool sorters' disease, in 1850. Eight years later Bernard identified the vaso-constrictor and the vaso-dilator nerves, important in the study of industrial physiology. The same year, 1858, Niemann isolated the local anaesthetic, cocaine. In 1859 Florence Nightingale, of London, published *Notes on Nursing* for her school for hospital training of nurses. The industrial nurse was to be developed later.

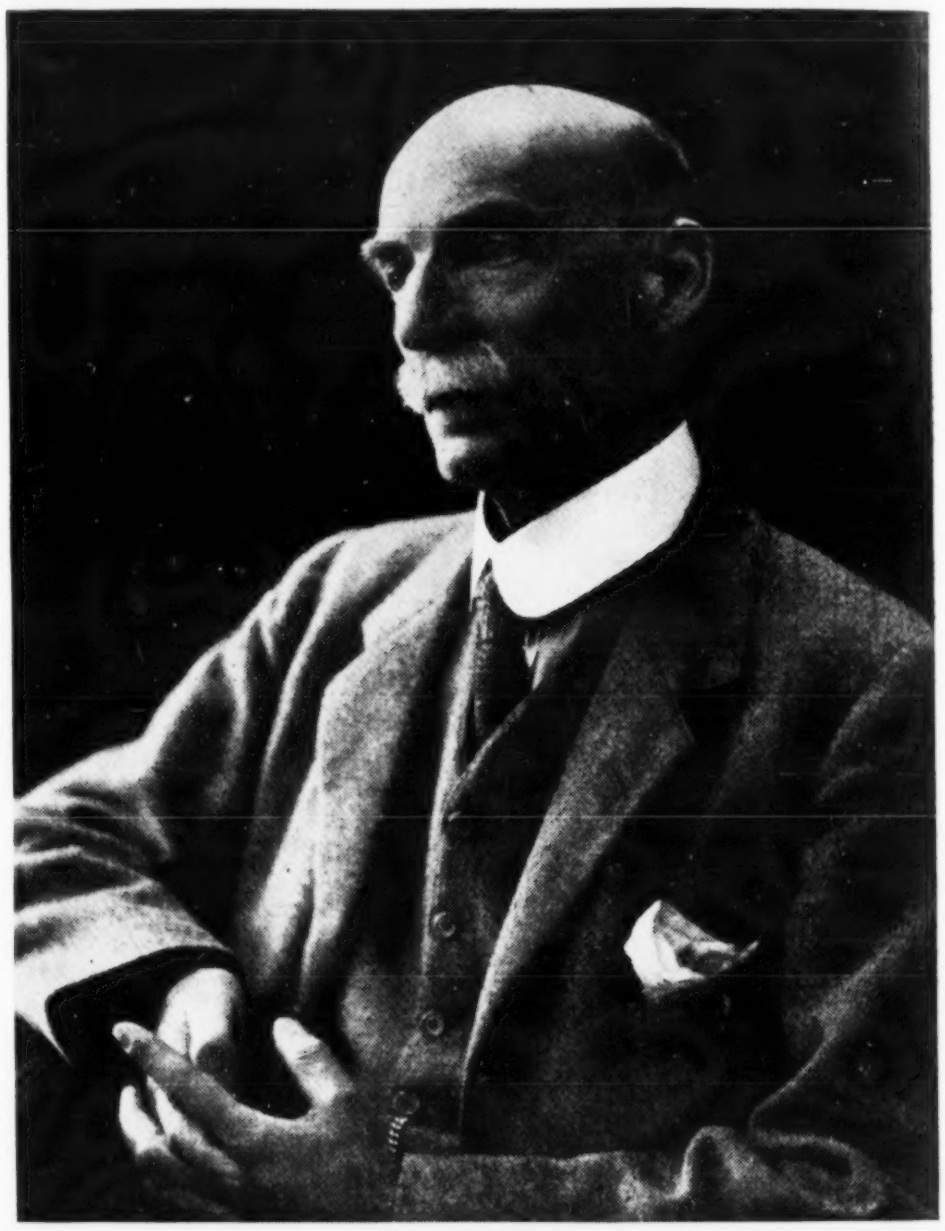
The nineteenth century saw many outstanding contributions in the various fields of industrial medicine. Many pioneers have independently investigated special problems, thus increasing the knowledge of prevention of occupational hazards. Already, in 1849, Francois Melier dealt with the hygiene of tobacco workers; in 1856 Schirmer, a German, had investigated diseases among lignite workers; in 1863, A. L. S. Delpech had investigated the rubber industry, and Keller the mirror workers. The year 1868 saw the publication of Kuntz' study of diseases affecting workers in sugar. Sir Thomas Arlidge published his masterpiece, DISEASES OF OCCUPATIONS, in 1892.

Since 1900 a great impetus to progress in industrial hygiene has been given by the increasingly scientific methods employed. England and Germany are first among the European countries in regard to the regulation of unhealthy trades. Special courses in occupational diseases are held in more than 10 German universities. The drafting of special rules affecting whole classes of workmen is becoming common. Investigation and research has been furthered by the statistical data of the German Accident and Sickness Assurance Associations. In the United States some large scale investigations into special diseases have contributed greatly to progress.

In Great Britain as a result of the World War there resulted the appointment of the Health of Munition Workers Committee, the work of which has since been supplemented by Home Office investigations into industrial fatigue. In 1916, as the result of the findings of this committee, an act was passed to secure the welfare of workers in factories and workshops.

Sir Thomas Legge, with the aid of factory inspectors and certifying surgeons, made important contributions to a great number of problems on industrial medicine during the early part of the twentieth century. He published a work on lead poisoning, and made valuable contributions to Kober and Hanson's DISEASES OF OCCUPATIONAL AND VOCATIONAL HYGIENE, 1916.

Though it is hardly over 25 years since serious attention was first bestowed on the problems of industrial hygiene in America, great progress has been made and mortality rates in many trades have been reduced. Doehring in 1902 made first American Survey. In 1910 the first National Conference on Industrial Diseases was called by the American Association for Labor Legislation. Part of the Fifteenth Congress on Hygiene and Demography, held at Washington in 1912, was devoted to occupational hygiene. The 64 contributions by distinguished scientists laid the foundations for scientific literature on industrial medicine in America, and in the following years many useful volumes were published. In 1915 a Division of Industrial Hygiene and Sanitation was created in U. S. Public Health Service with an office of Field investigation into occupational diseases. Harvard Medical School was the first in the world to confer a degree in industrial hygiene, during the session of 1918-1919. It is also responsible for the publication of the *"Journal of Industrial Hygiene,"* started in 1919. In 1925 a landmark was passed with the founding of the Society of Public, Industrial, and Social Hygiene, which devotes a part of its time to the study of problems of industrial pathology. This is located in Paris.



Sir Thomas Legge

And in 1932, in Chicago, INDUSTRIAL MEDICINE, "The Journal of Traumatic Surgery and Occupational Diseases," was established.

Preventive medicine to be effective must deal with the man as an individual as well as a member of the community. It must not be understood to consist only of sanitation, the control of communicable diseases, and vital statistics. There is the psychological aspect of preventive medicine, and there is also the fundamental problem of health. There must be a proper distribution of function in labor, a correct understanding of the part played by nutrition, rest, fatigue, by conditions of health, if waste is to be avoided and maximum energy maintained. A working man's capital is, as a rule, his health and his capacity to perform a full day's work. This physiological basis of labor is the new preventive medicine or industrial hygiene. Without health there is no energy, and without energy there is no output. "It is but a poor profit which is achieved by the destruction of health," were the words of the immortal Ramazzini. The civilized nations now realize the truth of the aphorism that man is the nation's greatest asset, and that health promotes wealth, happiness, and longevity.

It is impossible to write a history of industrial medicine without introducing the pioneers whose

researches in the medical, chemical, and biological sciences gave the world what constitutes its knowledge of scientific, curative, and preventive medicine. There are men now living who have witnessed in their lives more advancement in medicine than was accomplished in all the centuries before them since man became a civilized creature. In the preceding centuries the names of Paracelsus, Vesalius, Harvey, Leenwenholk, Galileo, Lavoisier, and others of minor importance stand out among the great men who helped to make present day medicine possible. The nineteenth century saw many new names added to the list from the various fields of scientific endeavor. We shall in the next chapter consider some of the fields of industries and the specific researches which made working in these industries more healthful and less hazardous for the working man.

Psychology

And Its Application in Claim Agency

By U. J. Wile, M.D.,

University of Michigan Medical School

IN ITS narrowest sense psychology is defined as the science of the human mind.* As such and in this narrow application it is of academic interest and finds its limitations in scientific university groups where it has become the basis of extensive laboratory experimentation. The experimental side of psychology has developed on an amazingly broad scale, and permits us now to establish in the laboratory by accurate experiments, behavioristic phenomena which in the past have been in the realm of abstract theory.

In a very much broader sense, however, psychology has been interpolated into our modern life as the evaluation of human behavior. This popular concept has led to the introduction into commercial and professional life, of lines of conduct, methods of salesmanship, business and professional relations which are based upon the evaluation or interpretation of the reactions that such methods bring about on the parties.

This practical side of psychology, namely the appraisal of the mental reactions of one's business or professional contacts, is not in any sense a new phase of modern human relationship. Broadly speaking, success measured not only by monetary return, but also by the better yardstick of leadership, has always been dependent upon this factor. It also follows that there are many who are singularly gifted, and, who, without any knowledge of the theoretical side of psychology, interpret admirably the reactions of those with whom they come in contact. It may, I believe, be said beyond any peradventure, that the ability to appraise the human mind under the varied conditions of life is a fundamental prerequisite of business, professional, political and military leadership.

If human reactions or if behavioristic phenomena were constant in a given individual under all circumstances, the subject would indeed be dull. We are however, all influenced in our reactions, in our mental processes, by conditions of health, by circumstances adverse or fortunte, under emotional stress, as well as at the various psychological periods of life. For these reasons human reactions in the same individual and prompted by the same stimuli represent a great variation.

Under no other circumstances is this so manifest as when the individual drops from the normal health level into a state of real or fancied illness. The physician, therefore, perhaps I should say the successful physician, of today can measure his success not only by his ability to diagnose disease and to treat it, but as well by the much more important factor of his ability to evaluate the patient's frame of mind, in other words the emotional and psychological backgrounds which accompany the diseased condition of his patient.

You of the Claims Departments of the various railroads see your human contacts under much the same condition as does the physician. To be sure you are not called upon to diagnose nor to treat disease. The vast majority, however, of your professional duties have to do with your fellow beings, who, because of real or fancied injury believe they have a claim.

Properly to evaluate or to appraise the justice or unfairness of such claims is, of course, of paramount importance in the success of your tasks. It goes without saying, therefore, that the greatest degree of success in the discharge of your duties will be achieved by those who can best evaluate the justice of the claims under consideration and solve these to the best interests of all concerned.

This brings me, however, to a most important consideration: How is your success in the management of such cases measured? Without having any concrete facts I dare say that in many instances the yardstick of your success is measured by the monetary considerations involved. In other words it would be quite natural for an executive to measure the success of a member of his staff by his ability to settle claims at the very lowest cost.

In these days, particularly in such corporations as those you represent, low costs are of paramount importance and must be of primary consideration in the successful management of the companies. Where one is dealing with such things as the price of coal, the maintenance of motive power, the purchase of steel, or the many other expenditures of a large company, there can be little consideration given other than to cost and quality. The best quality at the lowest cost must indeed be the slogan of every well organized business. In dealing, however, with human relationships it frequently becomes necessary to minimize the question of cost at the expense of what might be called "good will". Viewed from this angle it becomes quite obvious that the efforts of an occasional claims agent whose budget may seem large as compared with that of a colleague working under like conditions, should be measured by other standards than those of costs. The exercise of tact, the establishment of good will, the conservation of a friendly public opinion, are frequently relatively expensive as measured in terms of dollars, but actually in the long run may pay dividends over a policy of niggardliness and scrupulous attention to bare facts with the exclusion of what a great physician once called the "infusion of the milk of human kindness."

I am informed, and I am sure, that there are many instances in which claims are made against your companies which are from the very outset fraudulent. There is no brief to be held for such dishonest representations. Notwithstanding your eternal vigilance, I imagine that some of these

* Presented at the 1936 Convention of the Association of Railway Claim Agents, St. Paul, Minn., June 17, 18, and 19, 1936.

frauds succeed. Next to fraudulent claims are those in which the actual injury occurred in which there has been some accident either in the discharge of duties or incident to transportation.

Such claims can be divided into those injuries resulting directly from accident, and those many others in which the accident precipitates or accentuates a previous pathological condition which had existed prior to the alleged injury. Of the first group we need not speak.

In my experience with members of your group, as well as from several court experiences, I feel sure that the latter are frequently the most difficult cases to adjudicate. It has been my observation that claims based upon crippling injuries or permanent disabilities which are indirectly the result of injury sustained under conditions of transportation are usually decided in court in favor of the claimant. In many instances from a purely professional medical standpoint I can see the justice of such a decision. Let me cite you for example a case which may even seem to you as extreme, and which I know has been settled several times in favor of the claimant.

The individual suffers an injury, trivial or severe, following which a paralysis, permanent in type, may develop in the extremities. The medical evidence shows that the patient has had syphilitic disease over many years' time. The evidence further shows that the nature of the paralysis is purely that of post-syphilitic disease. On the face of it no corporation could possibly be held responsible for the causation of the patient's syphilis. Had he been otherwise well the same injury would not have proved a permanent disability. However, it is a well-known fact that the onset of symptoms referable to such a condition as locomotor ataxia is frequently initiated by injury. I have several times seen a rapid onset of paralysis following a fall on the street or a more or less trivial injury during exercise. It is a fairly logical conclusion, therefore, that if the syphilitic individual had not been injured in connection with his transportation relationship, he would not then at least, have suffered his paralysis, and it could not be determined definitely that he ever would have developed it had he not been injured.

The liability under these conditions seems to me quite clear. I cite this case merely to illustrate how difficult it must be for you to appraise at first glance the justice of the cases before you, and how often times a rapid decision or a hasty settlement, while of distinct advantage to your company from the financial standpoint, may perpetuate an injustice, the net results of which in the long run, are not only disadvantageous to the claimant, but in many ways may react unfavorably to your company. The measure, therefore, of the success of your subordinates in the discharge of a most difficult duty must not be entirely based on a budget.

It must be perfectly obvious to you that the practical applications of psychology which I have mentioned before play a most important role in the daily performance of your duties. The shrewdness with which you can detect fraud and malingering, the qualities of tact and consideration which must guide you in your treatment of just claims, must be the background of your equipment in maintaining not only the honest relation between your organization and the claimant, but also in the preservation of the good name and the public esteem which your organization should enjoy for fair play.

Such equipment, however, can lead to successful achievement only if the same psychological processes exist and are appreciated by the executives behind your department. The claims department of any organization cannot be judged by the same standards as those which apply to departments concerned solely with purchase, maintenance, law, engineering and the like.

In one sense there is an obvious objection, I think, to the designation by which you are known. The word "claims" carries with it certain implications which involve financial transactions. It is a pity, I think, that in the beginning the human side of this department was not better appreciated and a more fitting designation devised for this important branch of industrial organization. A far better name, it occurs to me, would be the "Department of Public Relations." So designated there is a direct implication of a friendliness which should exist to a greater degree between the railroad organization and the general public. At this time a commendable effort is being made to establish and maintain this spirit of friendliness.

I should now like to turn briefly to that phase of practical psychology which involves the claims agent himself, and not his business contacts. To what extent and how frequently is self analysis applied to the evaluation or to the appraisal of your own efforts in the discharge of business obligations? Have there been times, and does it frequently occur to you, that notwithstanding your efforts or because of them, this or that claim has been settled to the best advantage of the claimant on the one hand or the company on the other, in either case of which the feeling may exist that your efforts have been misdirected?

It would seem to me that the claims attorney or claims agent who by reason of his success in the expeditious settlement of claims, and who has achieved this through native shrewdness untouched by the "milk of human kindness," might well develop like that interesting and yet unpleasant character so frequently depicted in the *Saturday Evening Post*, who, as head of the claims department of a liability insurance corporation, operated under surprisingly low cost, was judged therefore successful, but became the bugbear of his subordinates, and whose general character left a most unpleasant recollection in the mind of the reader. How different indeed from the kindly old Mr. Tutt so ably portrayed by Arthur Train, whose shrewd appraisal of human motives was so wonderfully tinged by well-tempered kindness.

In the last analysis your self appraisal cannot be measured in every instance by your success in the defense of claims. I can well understand how to the honest individual, failure at times must give a greater sense of self satisfaction than success.

Many centuries ago a learned Roman once advised his son regarding his conduct in human relationships. This advice is today an admirable axiom for all those who have to do with ailing and complaining fellow beings. Strict adherence to it will in the long run not only be the guide to the equable adjudication of the issue, but also to the sense of personal satisfaction of a duty honestly, decently and fairly performed.

May I leave you, therefore, Polonius' advice to Laertes"

"This above all, to thine own self be true
And it must follow as the night the day
Thou canst not then be false to any man."

Industrial Medicine

The Journal of Traumatic Surgery and Occupational Diseases

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The Paper Film

LAST month's account of the meeting called by the Sub-Committee on X-Rays, of the Occupational Diseases Committee of the Illinois Manufacturers Association (INDUSTRIAL MEDICINE, June, 1936, p. 338), indicates that the problem of the extensive physical examinations of employees —precipitated by the Illinois Workmen's Occupational Diseases Act, effective October 1, 1936—was uppermost in the minds of all present. Since the necessary examinations would include x-rays of the chest, the discussion was largely given over to x-rays, and x-ray methods and means. Among the latter, the paper x-ray film came in for extensive comment.

But this comment, somehow, got off on the wrong foot. It seemed to center about the erroneous proposition that the paper film stood in the relation, as it were, of a contending party with the celluloid film—that the situation would be celluloid *versus* paper. And thus a great deal of time and many words were used in comparisons which might better have been devoted to descriptions.

The essence of the matter has been thus authoritatively set forth:

"In *large surveys* the rapid *paper film method* has been found highly effective and economical."* (Our italics.)

It has been the experience of those medical men who had the interest and have taken the time to become acquainted with the paper film, together with the intendments and methods of its use, that as between the paper film and the celluloid film the developments will be *plus* instead of *versus*.

For the one complements the other, and the availability of *both* is the answer to an economic need, and the bridge over an economic gap.

This becomes very apparent upon investigation. Indeed, recent investigations by a number of prominent Roentgenologists identified with industrial medical problems—aimed at getting acquainted with the *intended* application of the paper film *in its proper use*—have had results which suggest a line from John Bunyan's immortal work: "When he understood it, he called for his friends and told them of it." The outspoken reactions of many, in fact, will sustain also a slight paraphrasing of Bunyan's next sentence: "Although it is with some study I have got thither, yet now I do not repent me of the pains I was at to arrive where I am."

* In an article, "Case Finding Methods for the Diagnosis of Tuberculosis," by J. BURNS AMBERSON, M.D., in *J.A.M.A.*, July 25, 1936.

The Policy of the Legislature!

THE new "Article 4-A," recently inserted into the Workmen's Compensation Law of New York State starts off:

"It is hereby declared to be the policy of the legislature of this state, in enacting this Article, to prohibit, through every lawful means available, any requirement as a prerequisite to employment which compels an applicant for employment in any occupation coming within the purview of this Article to undergo a medical examination."

The Article is for "Prevention of Silicosis and Other Dust Diseases." One reads — and one wonders!

Political Medicine!

THE following paragraphs are quoted from a recent editorial in the *Chicago Daily News*:

"In West Virginia it was the state relief administrator himself who wrote a county relief supervisor:

" 'I hand you herewith a list of doctors in Ohio County. Kindly separate the Democrats and the Republicans and list them in the order of priority so we may notify our safety foremen and compensation men as to who is eligible to participate in case of injury.' "

Besides the obvious comment that this is an insult to the medical profession, and the also obvious suggestion regarding the Vicar of Bray, we are particularly irked by the word "participate." Is the money collected from the many who need it, for the emergency relief of those who need it more, a jackpot? And the part of it to be used for injuries a form of royal *largesse*?

If there is this much of political manipulation in the matter of legislative measures intended for relief of need—where the need is not debatable, and has no economic answer except legislative relief — how much more, and possibly still more odious, political manipulation there will certainly be in state medicine—where the need is debatable on so many grounds that it is obviously more alleged than real, and the economic answer, in the opinions of many who are well informed, lies to a considerable extent in stopping at the source the tremendous diversion of money into the proprietary channels of self medication!

Industrial Medicine and Surgery

Occupational Diseases in Ohio

BROADLY conceived, an occupational disease is an affliction which has resulted from exposure to an industrial health hazard while an industrial health hazard is any condition or manner of work that surpasses the capacity or tolerance of the individual as employed.

Commonly, through experience and training one can enlarge one's capacity to maintain one's normal state of being in the face of physical stresses of reasonable proportions. This requires sufficient time. Infectious hazards in industry may or may not bring about immunity—the same as under non-industrial circumstances. Some of the poisons occurring in industrial pursuits may establish a certain degree of apparent tolerance (e.g., carbon tetrachloride vapors, zinc fumes), but the reverse is almost the universal rule.

The Ohio Occupational Disease Survey, which was made by the State Board of Health, 1913-15[1], proceeded along a simple formula which was easy to remember—dust, dirt, dampness, darkness, devitalized air, temperature (heat, cold), fatigue, inactivity, infections, poisons, and miscellaneous. Accurate methods of determining hazards were not attempted because of the limitation of time and funds so that the opinions of non-prejudiced investigators, chiefly physicians and chemists, were utilized.

By this means, 1,040 establishments were investigated in 81 cities and villages, covering the workplaces of 225,984 wage-earners, of whom 35,048 were females, and each particular process was analyzed by the above formula. The investigators carried cards upon which the hazards were further subdivided so that, for example, dust was opinionated in respect to type, amount, whether breathed or affecting the skin or eyes, its method of confinement and removal (if any), the use of respirators, carelessness, dry sweeping, etc. Dirt called attention to unsanitary conditions, disorders, etc. Dampness included humidity, water, steam, vapors, and unusual dryness. Darkness was the key word for checking an array of illuminated hazards; and so on, through the list of hazards.

For a preliminary survey, this method appeared to work out very satisfactorily. It was at least conservative and the final report drew no criticisms as to unjust statements. Even at this date, one cannot fail to be impressed with the extensive amount and kind of hazards to health which were discovered, and of the health complaints and occupational diseases which were reported. Unfortunately, this report is out of print, but copies of the forms of analysis used can be found elsewhere.[2] Nominally the same hazards are still to be looked for in any industrial health inquiry today.

Since occupational diseases have come to be compensated in Ohio, it is interesting to view their causes and to note how such causes have been considered in the compensation scheme. Dust is not covered except as it may affect the skin as an irritant. Illumination, e.g., glassworkers' cataract, electrica ophthalmia, nystagmus, is also not included. No dampness or devitalized air, or other ventilation afflictions have appeared with enough perspicousness to be named in a compensation schedule, although generally faulty air conditions are still of constant complaint. No afflictions, other than accidents, due to extreme of heat or cold are yet compensable, while thermic fever and athermic conditions still remain more or less curiosities for the physiologist and bacteriologist. Under fatigue, however, tenosynovitis when involving the muscles of the hand or wrist is scheduled; also prepatellar bursitis, which, in a sense, may be considered a matter of repeated friction or pressure against the knee. Both of these afflictions register a considerable number of cases each year.

No inactivity disease states are compensable as such, but, as a matter of fact, such workers are usually involved with the over-use of certain parts of the body (eyes, hands, etc.)

Certain infections have been recognized as compensable, e.g., anthrax, glanders, and the large group coming under Schedule 11, "Infection or inflammation of the skin on contact surfaces due to oils, cutting compounds or lubricants, dust, liquids, fumes, gases or vapors". "Dermatitis" is the convenient short term used for this whole expression. "Machinist's boils" made up the chief infections reported. These are chiefly from oils, greases and cutting compounds.

Poisons have been recognized as compensable for certain of them, viz., lead, mercury, phosphorus, arsenic, benzol (and its nitro-or amidoderivatives), volatile petroleum products, carbon bisulphide, wood alcohol, carbon dioxide, brass or zinc, manganese dioxide, radium, chrome ulceration nasal and skin), potassium cyanide, and sulphur dioxide. Even Schedule 12, epithelioma would be included here. Among the miscellaneous, compressed air illness (which is really an accidental occurrence) is compensable.

In time, noise with its production of deafness (boiler-makers' deafness) may come to be recognizable as a compensable affliction, but such is not yet the case.

Thus, it can be seen that true, characteristic or specific occupational diseases are readily associated with certain industrial health hazards.

Many common afflictions have an occupational ear-mark, however. A comprehensive classification of occupational afflictions of all kinds might well be given as follows:

(1) True occupational diseases, i.e., those which seldom occur outside of the place of employment and can be shown to be due to some health hazard (s) encountered therein.

(2) Diseases partly occupational in nature as when tuberculosis, or pneumonia, show notably high rates in connection with certain occupations. This is a large group, and involves cases of aggravation, and is difficult to separate from like afflictions in the general populace.

(3) Occupational health complaint, such as stiffness, headache, insomnia, etc. These complaints are not true diseases, but are simply symptoms which indicate that one's "threshold" or limit of tolerance is being strained. These complaints indicate that, unless working conditions or the manner of work are bettered, disease may follow.

(4) Bodily non-conformities which are neither actual diseases or complaints, such as round-shoulders, habit spasms, etc.

The Ohio Compensation Schedule became effective in August, 1921, and included the first 15 named in the accompanying Table I. The list was chiefly patterned after the English schedule of that time. Of the remaining six diseases on the present schedule, three were added by Legislative Act in 1929, and three in 1931. Under the Ohio law, additional occupational diseases can be added to the compensation schedule only by an Act of the Legislature.

The fund for covering all disbursements for occupational diseases in Ohio is derived from a one cent charge per -100.00 pay roll of all employers in the state who come under the Compensation Act. In the nearly 10 years in which this method of raising the Fund has been used, it has always proved adequate.

A recent statistical analysis by states, based on the 1930 U. S. Census showed that Ohio is the second largest industrial state in regard to the number of employes in health hazards industries — Pennsylvania being first. According to these figures, Ohio's employes in manufacturing and mechanical industries numbered 1,048,169 and, in the extraction of minerals, 46,481. Since Ohio's employment codes covering safety and health are quite abreast of any in the country, however, it should not be assumed that real hazards actually exist in the so-called hazardous occupations as classified.

The summary for 1935 shows that 1400 cases were reported to the State Department of Health in 1935 (omitting 88 "incompletes"), a decrease of 156 from the preceding year (1556), but the second highest for any year since the reporting law became effective in 1913. Two hundred and eighty-four cases, or 20.3% were females. The year before, 290, or 18.6% were females.

This total of 1400 cases was reported by 671 physicians, or 7.5% of the 9000 practicing physicians in Ohio in 1935, and was employed by approximately 785 different employers.

In 1935, Dermatitis, with 875 cases, constituted 61.2% of the total reported. The leading causes of dermatitis were: Oils, greases and cutting com-

*EMERY R. HAYHURST, M.D., Columbus, Ohio, Consultant in Occupational Diseases, Ohio State Department of Health, in *Ohio State M. J.*

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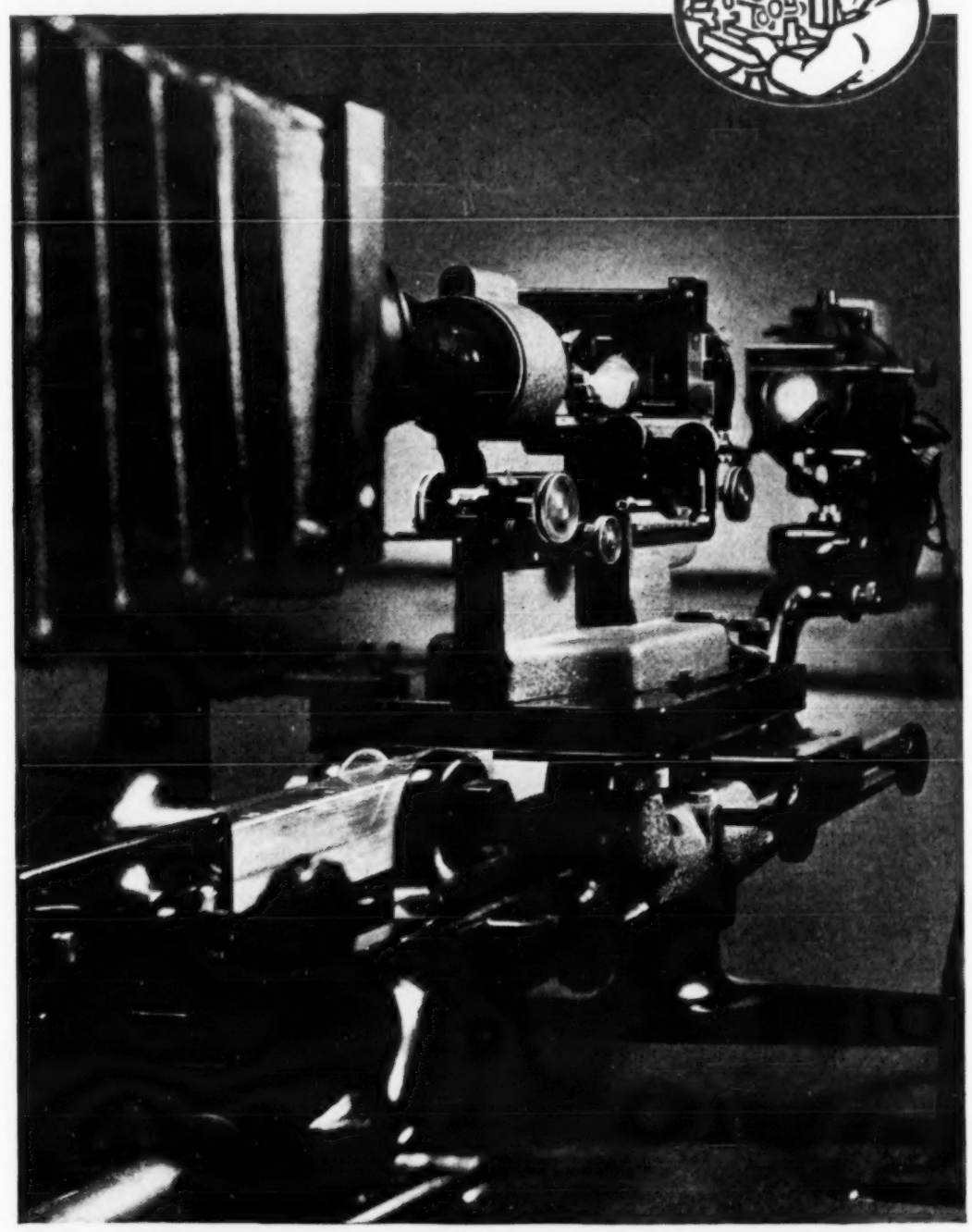

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Lead Poisoning comprised 102 cases (60 less than in 1934). The chief causes of lead poisoning were: storage batteries, 23; painting, 16; automobile manufacturing and repairs, 9; brass and soft metals, 9; lead manufacturing and lead melting, 7; caskets, 6; printing and publishing, 5; potteries, 5; sanitary ware, chiefly the enameling process, 13. Of the lead cases, four were females—three engaged in decorating glassware and one a glazer in pottery ware. In the seven years (1928-1934, inclusive), 61 deaths were associated with lead poisoning (figures for 1935 not yet at hand).

There were also reported 49 cases of chrome ulcers—26 of the skin, 21 of the nasal septum (including three females), and two unspecified. Other compensable poisonings totaled 24—arsenic 3; benzol and derivatives, 7 (one female); brass and zinc, 3; petroleum and its derivatives, 7 (including carbon tetrachloride, 3), and the balance scattered. Tenosynovitis of the hand (wrist) registered 218 cases, of which 60 were females; and prepatellar bursitis or "house-maid's knee," 25 cases, of which five were females. Compressed Air involved only one case, the effects being upon the ear.

The following compensable diseases reported no cases: Anthrax, glanders, mercury, phosphorus, carbon bisulphide, epithelioma or cancer, manganese dioxide, and radium poisoning.

Interest centers chiefly around the non-compensable cases, 106, (including 13 females, seven of whom suffered constitutional poisoning). In 89 of the 106 cases, a harmful agent was specified: Dust (pneumoconiosis), 52; tenosynovitis (other than the hand), 6; chronic or repeated carbon monoxide poisoning, 4; cyanide poisoning (other than potassium cyanide which is compensable), 4; and the balance scattered. The remaining non-compensable cases, 17, were classed as afflictions since the causative agents were not specified. There is a tendency not to report these cases, as they are not compensable, although the law requires all occupational diseases to be reported.

Analyses of the 52 dust cases showed diagnoses as follows (only a few checked by this Department*): Silicosis, 24; silicatosis, 1; asbestosis, 1; combined silica, 14 (anthracosis, etc.), and other and unspecified, 12. The dust cases came from various industries and operations such as foundries, grinding, polishing, buffing, sand-blasting, sand-papering, coal mining, etc. Only 5 of the 19 tuberculosis institutions in the state reported upon pneumoconiosis. Hamilton County, the largest (635 beds), reported no case of any form of pneumoconiosis. Four others reported a total of 25 cases, but of these, 18 had entered the institutions in previous years (two of which already were of record). Of these 25 institutional cases, 15 were reported as complicated with tuberculosis.

Only one case of tularemia and one of undulant fever were reported as industrial in origin.

During the eight-year period, 715 none-compensable cases were reported, of which 491 were "agent" cases and 224 were "afflictions." Of the 715 cases, 234 were due to inhaling dust, 11 were asthma, 47 bronchitis, 67 tuberculosis (allegedly industrial), 8 upper respiratory irritations, and the balance scattered.

Summarizing, of the 1400 cases reported in 1935, 223 occurred chiefly through inhaling the substances, 915 by way of the skin (including 8 eye cases), 224 through strain, 27 through friction or pressure, and 11 through other non-specified means.

Acute mishaps, even though due to poisons, corrosives, asphyxiating agents, etc., are not included in any of the figures.

From the date of the first report, received May 15, 1913, to the end of 1935, a total of 18,843 cases were reported. Of these, 2575 were reported in the eight years prior to the time compensation for occupational diseases began (August 4, 1921) or an average of 322 cases a year, but since compensation began, 16,171 cases have been reported, or a yearly average of 1121 cases.

Schedule Number	1928	1929	1930	1931	1932	1933	1934	1935	Tot'l
1. Anthrax	.....	.....	.....	.....	.....	.....	.....	.....	.....
2. Glanders	.....	.....	.....	.....	.....	.....	.....	.....	.....
3. Lead Poisoning	180	183	134	114	148	134	162	102	1157
4. Mercury poisoning	.....	.....	.....	.....	.....	.....	.....	.....	.....
5. Phosphorus poisoning	.....	.....	.....	.....	.....	1	.....	.....	1
6. Arsenic poisoning	.....	2	1	2	3	1	3	3	15
7. Benzol poisoning (and nitro- or amido-derivatives)	11	11	3	6	9	3	10	7	60
8. Volatile petroleum products poisoning (gasoline, benzine, naphtha, etc.)	3	4	2	6	5	9	10	7	46
9. Carbon bisulphide poisoning	1	1	.....	18	2	1	1	.....	24
10. Wood alcohol poisoning	1	.....	.....	1	.....	.....	.....	1	3
11. Dermatitis*	894	985	884	833	621	726	913	875	6730
12. Epitheliomo (skin or eyes) due to carbon, pitch, tar or tarry compounds	3	2	1	5	1	1	.....	.....	13
13. Compressed air illness	16	62	59	5	20	3	2	1	168
14. Carbon dioxide poisoning	.....	.....	.....	.....	.....	1	1	1	3
15. Brass or zinc poisoning	7	5	2	10	2	12	8	3	49
16. Manganese dioxide poisoning (1)	.....	.....	.....	.....	.....	.....	.....	.....	.....
17. Radium poisoning (1)	.....	.....	.....	.....	.....	.....	.....	.....	.....
18. (a) Tenosynovitis (hand) (1)	.....	**	37	130	166	149	191	228	218	1119
(b) Prepatellar bursitis (1)	.....	**	13	23	29	23	19	27	25	159
19. Chrome ulceration (nasal and skin) (2)	6	10	20	16	79	20	43	49	243
20. Potassium cyanide poisoning (2)	3	2	.....	1	3	5	.....	1	15
21. Sulphur dioxide poisoning (2)	2	.....	.....	5	4	2	7	1	21
Total	1127	1317	1259	1217	1069	1129	1415	1294	9826

*Specified as "Infection or inflamation of the skin on contact surfaces due to oils, cutting compounds or lubricants, dust, liquids, fumes, gases or vapors".

**Statistics not kept on Tenosynovitis and Bursitis in 1928. Both of these afflictions had been compensated as "accidental" injuries previous to July 1, 1929.

(1) Added to compensable list July 31, 1929, by Legislative Act, 89th General Assembly.

(2) Added to Compensable list July 9, 1931, by Legislative Act, 90th General Assembly.

Summary of Compensable Occupational Diseases reported 1928-1935, Inclusive

*In the diagnosis of silicosis and other pneumoconiosis, this Department has followed the recommendations of the Committee on Pneumoconiosis of the American Public Health Association as rendered in 1932 and 1935.

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1. HAYHURST, E. R.: A Survey of Industrial Health Hazards and Occupational Diseases in Ohio. Ohio State Bd. of Health. Feb., 1915, 438 pp.

2. KOBER and HAYHURST: Industrial Health. Phila.: P. Blakiston's Son & Co., 1924. (See pp. 1068-1069).

3. *Ohio Health News*, XII, 3:1-2 (Feb. 15), 1936.

New Chlorine Germicide

AZOCHLORAMID, a new chlorine germicide, recently approved by the Council on Pharmacy and Chemistry of the A.M.A., is attracting attention in the current literature. This new product, a complex aliphathic organic chloramine, is chiefly distinguished for its remarkable stability and lack of irritation when applied to unprotected skin. An N-chloro compound, its basic property is the unusually low degree of dissociation at the N-Cl linkage—in other words, the extremely slow rate with which it liberates chlorine.

Previous to the synthesis of this product, the chief difficulty with the application of chlorine germicides in surgical antisepsis, was the rapidity with which the available chlorine was consumed when placed in contact with organic matter. In the use of Azochloramid this difficulty has been remedied to so great an extent that wet dressings placed in contact with infected wounds have been shown to retain active chlorine for periods in excess of 24 hours.

In common with other chlorine germicides, Azochloramid is noted as being non-selective in bactericidal action, having demonstrated its effectiveness against all types of bacteria, both anaerobic and aerobic, gram positive and gram negative. In the recommended concentrations it is non-toxic and has no cumulative action.

Azochloramid is available in several forms suitable for office and hospital use. Azochloramid in Triacetin 1:500, a solution adapted for immediate use without dilution and which may be stored for extended periods without risk of deterioration, is particularly applicable to dressing or packing infected wounds and abscesses; while Azochloramid Saline Mixture, adapted for the easy preparation of a physiological saline solution with no more involved procedure than the addition of the proper quantity of warm distilled water, is usually selected for irrigating wounds in the Carrell Technique, for flushing wounds or abscesses before the dressing is applied, and for both irrigation and instillation in the treatment of empyemata.

Dr. Robert H. Kennedy,[1] in reporting on the use of Azochloramid in over 100 cases over a two-year period, suggests the following applications:

"As a prophylactic in unclosed lacerated wounds, whether debrided or not; in unclosed compound fractures after debridement; in abdominal operations, where on account of intra-peritoneal infection it is believed advisable to close the peritoneum only and leave the remainder of the wound unsutured but packed with gauze; in infected wounds and abscesses of all types, except where gross slough or foreign bodies are present and have not been removed (this does not refer to an abscess wall which we have seen come out en masse after a few days); in preparation of burned areas for skin grafting; and as a continuous wet dressing over fresh pinch grafts."

Dr. Kennedy also lists the following advantages of Azochloramid when compared to other chlorine antiseptisis:

"It is easier to prepare and more stable than the original Dakin's Solution; rarely irritates unprotected skin; in oil irritates skin less commonly than dichloramine T; can be used immediately in the dressing of pinch grafts; and less frequent application is required."

Dr. H. A. Goldberger,[2] after using this new germicide on a diversified series of cases over a period of 16 months, offers the following conclusions:

1. Azochloramid, N-N-Dichloroazodicarbonamidine, a new germicidal chlorine compound of low potential has been used in 351 cases of infected wounds. Azochloramid in saline 1 to 3300, and Azochloramid in Triacetin 1 to 500 were the preparations most frequently used.
2. Surgical infections are most satisfactorily managed by adequate drainage supported by treatment with an effective germicide.
3. Azochloramid has been demonstrated, both experimentally and clinically, to be a useful germicide, capable of wide application.

Medical Bill

THE industrial colossus, E. I. Du Pont de Nemours & Co., Inc., which speaks only in millions, bared the tremendous scope and cost of medical work throughout its plants at the third annual conference of its Medical Division in Wilmington, Delaware, last month: $750,000 is spent annually on hospitals, first-aid stations, and doctors' offices. A like sum goes to about 120 physicians, surgeons, nurses, and technicians.*

1. KENNEDY, R. H.: Use of Azochloramid in Infected Wounds.
2. GOLDBERGER, H. A.: The Treatment of Surgical Infections with Solutions of a New Chlorine Compound of Low Potential.

* *Medical Economics*, June, 1936.

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Unauthorized Physician Cannot Collect Fee in Compensation Practice

THE attention of physicians throughout the State is called to a recent decision and opinion by Supreme Court Justice Bernard L. Shientag of New York County upholding the medical practice amendment of 1935 to the Workmen's Compensation Law in a compensation case where the physician, unauthorized to practice according to the provisions of the amended law, was unable to collect fees for services rendered. The decision involving the payment of medical fees in compensation cases is of special interest at this time because of the fact that the Compensation Medical Fee Schedule has just become operative in Greater New York and vicinity, and a similar schedule is now being considered for up-State districts.

Dr. Eugene Szold brought an action against the Outlet Embroidery Supply Co., Inc., of New York, to recover payment for services rendered in treatment of an injured employee entitled to medical care under the Workmen's Compensation Law. The employer arranged for the physician to render this treatment but refused to pay him. Dr. Szold then brought action under common law to recover. The employer moved to dismiss the physician's complaint before Justice Shientag on the ground that it failed to set forth a cause of action in that it contained no allegation that the particular medical services were rendered in an emergency and, specifically, that it failed to state that the plaintiff was authorized to render medical services by the Industrial Commissioner in accordance with the provisions of Chapter 258 of the Laws of 1935, which became effective July 1, 1935.

In granting the motion to dismiss the complaint, Justice Shientag said:

"The sole question raised on this motion is whether the failure to include such an allegation in the complaint renders it defective so as to entitle the defendant to a dismissal. . . ."

"There is no question but that under the Workmen's Compensation Law as it stood prior to the amendment enacted by the Legislature in 1935, the plaintiff's complaint would state a good cause of action against the defendant. While the old law provided for medical care and treatment of injured employees there was scant provision regulating the rendering of such treatment. . . .

". . . The new law establishes a system whereby the rendering of medical care under the Compensation Act is restricted to physicians specifically authorized to do such work by the Industrial Commissioner. Section 13-b of the Workmen's Compensation Law . . . provides:

" 'The Commissioner shall upon the recommendation of a medical society in each county or of a board designated by such county medical societies, or by a board representing duly licensed physicians of any other school of medical practice, authorized physicians licensed to practice medicine in the State of New York to render medical care under this Chapter. . . .

" 'No person shall render medical care under this Chapter without such authorization of the Commissioner, provided that: (a) emergency (first aid) medical care may be rendered under this Chapter by any physician licensed to practice medicine in the State of New York without authorization by the Commissioner under this Section; and (b) a licensed physician who is a member of a constituted medical staff of any hospital may render medical care under this Chapter while an injured employee remains a patient in such hospital; and (c) under the active and personal supervision of an authorized physician medical care may be rendered by a registered nurse. . . ."

"Equally important is Section 13-f, subdivision (1):

" 'Fees for medical services shall be payable only to a physician or other lawfully qualified person permitted by Section 13-b of this chapter to render medical care under this chapter, or to the agent or to the executor or administrator of the estate of such physician. No physician rendering treatment to a compensation claimant shall collect or receive a fee from such claimant within the state, but shall have recourse for payment of services rendered only to the employer under the provisions of this chapter . . .'

"The purpose of the law clearly is to restrict the treatment of all compensation patients to doctors who have been authorized by the Industrial Commissioner. Except in case of emergency, and where a patient is confined in a hospital only an authorized physician may render medical care and obtain payment therefor. Neither of these exceptions is present in the case at bar . . .

'The plaintiff in this action contends that he has a common law right to proceed against the employer for the collection of his bill and that such common law right is not subject to the limitations of the amended law. Various cases are cited in support of such contention. All of those cases, however, were decided under the old law, when there was no restriction as to what doctors were entitled to engage in compensation medical care, and they are no longer valid as precedents under the amended statute.

". . . Whether the doctor is chosen by the employee, or under certain enumerated conditions by the employer, one thing is implicit in the amended statute, the physician must be one authorized to render medical treatment in workmen's compensation cases.

". . . It would be a far-fetched construction of the statute and one leading to unjust results to hold that if an employee selected a physician he must be one duly authorized under the act, whereas if the choice were one which the employer could make he might select any physician whether authorized to render services under the Workmen's Compensation Law or not. . . .

"If the plaintiff in this action is entitled to prevail there can be no question but that the desirable benefits of the 1935 amendments to the Compensation Law will to a large extent be nullified. Any unauthorized physician would then be entitled to bargain with employers for the treatment of injured employees. Whenever the employee does not object, and in many cases due to pressure from the employer or through ignorance of the law he will not object, such unauthorized physician would be in a position to provide medical care for fees at variance with the prescribed schedules of minimum fees and without being subject to the disciplinary provisions of the amended statute. The door would then be open to a revival of the very abuses which the amended law was intended to cure, the cut-throat competition and commercialization of compensation medical practice, the improper 'lifting' of cases and the inadequate and inefficient treatment of workers . . .

"The practice of medicine is a property right, but one which is subject to the most stringent regulations. The right to practice medicine must yield to the paramount right of the state to protect health by any rational means. (Lawrence v. Board of Registration in Medicine, 239 Mass., 424; People, etc. v. Witte, 315 Ill., 282.

"The rule is well established that a state may, without violating the constitutional rights of an individual prescribe reasonable regulations for the practice of medicine within its boundaries. 'It is too well settled to require discussion at this date that the police power of the states extends to the regulation of certain trades and callings, particularly those which closely concern the public health. There is perhaps no provision more properly open to such regulation than that which embraces the practitioners of medicine.' (Watson v.Maryland, 218 U. S., 173, 176; see also Steinbach v. Metzger, 63 Fed. (2d), 74; People, etc. v. Ellis, 162 App. Div., 288; People, etc. v. Mulford, 140 App. Div., 716 aff'd. 202 N. Y., 624.)

"The power of the legislature to regulate medical practice is clear. As the state may impose requirements pre-requisite to a license to practice medicine generally, so it may impose additional requirements as a condition to permitting a physician already licensed as such to practice and to treat employees under the Workmen's Compensation Law. That the need for such additional regulation was a real one cannot be questioned.

"The right to practice medicine is not essentially different from the right to practice law. Yet the fees of attorneys in compensation cases have been strictly limited and the courts have upheld those limitations. (See Sec. 474, Judiciary Law; sec. 24, Workmen's Compensation Law; Rule 17-a of the Rules of the Industrial Board; Matter of Fisch, 188 App. Div. 525.) Even if some of the common law rights of the plaintiff have been abrogated or restricted, the provisions of the amended statute do not offend against any vested right.

"No person has a vested interest in any rule of law entitling him to insist that it shall remain unchanged for his benefit. (N. Y. Central R. R. v. White, 243 U. S. 188, 198.)

•From *The Industrial Bulletin*, State of New York Dept. of Labor, June, 1936.

THE BULLETIN

of

The American Association of Industrial Physicians and Surgeons

THE object of this Association shall be to foster the study and discussion of the problems peculiar to the practice of industrial medicine and surgery; to develop methods adapted to the conservation of health among workers in the industries; to promote a more general understanding of the purposes and results of the medical care of employees, and to unite into one organization members of the medical profession specializing in industrial medicine and surgery for the mutual advancement in the practice of their profession.

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The 1936 ANNUAL MEETING of the American Association of Industrial Physicians and Surgeons will be held in Atlantic City, New Jersey, on October 7-8-9. Headquarters will be at the Traymore Hotel. On the first and last days there will be Joint Sessions with groups from the National Safety Council, of which one of the Fellows of the American Association of Industrial Physicians and Surgeons, Dr. Cassius H. Watson, is President.

"The requirement here in question is reasonable and one within the power of the legislature to make in the interests of the health and welfare of injured employees and in order that employers and the community may receive the full benefits of the humanitarian law, the cost of administering which they bear. The requirement for authorization of physicians to treat compensation cases bears a reasonable relationship to the orderly and efficient administration of the remedial statute of which it is a part. It is in the interest of the physicians of the state as well. The large number of decent, reputable, competent physicians are fully protected. It is significant that the Medical Society of the State of New York, as amicus curiae, has submitted a most convincing brief in support of the position here taken.

"Courts should be slow to interfere in a field where the legislature is competent to act.

"The Workmen's Compensation Law as a whole and in its component parts should be liberally construed with a view to the accomplishment of its humane purpose.

"I hold therefore:

"(1) That the legislature has power to abrogate in whole or in part the common law rights of physicians who treat workmen's compensation cases. By that I mean, for example, that the legislature has power to provide that a physician's exclusive remedy to recover payment for treating compensation cases shall be under the Workmen's Compensation Law and not in the courts; that it may by reasonable provisions restrict and limit the contractual relations between physicians on the one hand and employers or injured employees on the other, and that such reasonable restrictions may be made applicable not alone to awards to physicians under the Workmen's Compensation Law but to actions for services in the courts as well.

"(2) The requirement that only physicians who are specially authorized by the Industrial Commissioner for that purpose may treat injured employees in accordance with the provisions of the Workmen's Compensation Law is a reasonable one calculated to accomplish the humane objects of that statute and to do away with the abuses and evil practices that arose in connection with its administration.

"(3) No physician under the amended statute is permitted to treat compensation cases or entitled to be paid therefor unless he is 'authorized' by the Industrial Commissioner and this applies whether the physician is chosen by the employee or by the employer.

"(4) Assuming but not deciding that a physician chosen by an employer to treat a compensation case, may, despite the amended statute, sue the employer in the courts for payment of his services, as a condition to recover he is required to allege and prove that he was duly 'authorized' to render medical care to injured employees under the Workmen's Compensation Law."

Removal of Piece of Steel from the Vitreous

THE presence of a foreign body within the eye ball is not an uncommon occurrence.* The injury occasioned by its presence is always serious and in many instances is responsible for the destruction of the eye. In every injured eye with a perforating wound the possibility of a foreign body being in its interior must be eliminated. Naturally, the character of a foreign body within the eye is of concern to us, for this may determine the possibility of its removal. Of the commoner types may be mentioned different kinds of metals, glass, splinters of wood and occasionally small pieces of stone. We are also hopeful that no infection has been carried into the eye by the foreign body. Of the instruments and methods used in determining its presence within the eye, naturally, we employ the ophthalmoscope first,

* CLAUDE T. WOLFE, M.D., Louisville, Ky.; read before the Louisville Medico-Chirurgical Society; published in *Kentucky M.J.*, June, 1936.

but should the media be clouded by hemorrhage or corneal lenticular or vitreous opacities a satisfactory examination with this instrument would be impossible. Our next and most dependable method is the x-ray. This method goes farther and even localizes the foreign body with such accuracy. To Drs. Sweet and Dixon particularly, are we deeply indebted for their work along this line. Further discussion in this respect will be left to roentgenologists.

Possibly particles of glass cause the roentgenologists most concern from the standpoint of determining their presence and particularly their localization, but frequently a shadow can be seen if the work is done with extra care. Fortunately glass within the eye, being chemically indifferent, may be harbored with but little reaction. Copper provokes a decided and prompt reaction within the globe and generally is responsible for the loss of the eye.

The resting place of the foreign body is of prognostic importance as the iris and ciliary body being abundantly supplied with blood vessels and nerves show a tendency to tolerate any type of foreign body least, while the lens may accommodate a sterile particle over an indefinite period of time. On the contrary, the choroid and retina, both vascular structures, treat a foreign body with much more tolerance and throw around it a covering of plastic exudate, occasioning but little, if any, reaction for a considerable time. The vitreous may on occasions allow a foreign body to float freely in its structures for an indefinite period of time, but this is the exception as not all foreign bodies enter the eye as sterile particles.

All parts of the internal structures of the eye ball offer excellent media for the growth of bacteria. Much depends upon the virulence of the organism that may have been introduced with the foreign body. Should an active infective process become established our efforts to save the eye usually end disastrously.

The location of the foreign body determines the route we choose in our attempt to remove it. If located in the lens or anterior to it we choose the anterior route. If its location is posterior to the lens the posterior route is the method of choice.

My own experience has emphasized the safety and practicability of removing foreign bodies through a scleral incision whenever they are at all accessible. An early argument that a scleral incision predisposed the patient to a detachment of the retina hasn't been substantiated by recent observers. On the other hand by drawing a magnetic foreign body, situated in the posteriod segment of the eye, forward by placing a tip of the giant magnet on the cornea endangers the eye to an iridocyclitis with a possible transferred ophthalmitis. It necessarily follows that every attempt is made to prevent traumatism to the structures in the anterior segment of the eye.

Our results, both immediate and remote, depend upon these factors, first, the early removal of the foreign body with emphasis upon its accurate localization. The minimum of traumatism occasioned by its entrance into the eye, and whether injury to the ciliary body and the macular region has occurred. Then, too, the bacteriologic and chemical character of the foreign body must of necessity influence our results.

The achievement of having extracted a foreign body from the interior of the eye may fill us with pride, nevertheless, we must bear in mind that occasionally degenerative processes may take place months or years later and our early happiness may be changed to grief. Another possibility, though in most instances quite remote, is the development of sympathetic ophthalmia. In all cases our prognosis must of necessity be a guarded one, even in cases where victory has apparently been won, as in the case I am about to report.

Mr. R. A., age 56, consulted us September 13, 1935, with a history of having injured his right eye on May 5, 1935, practically 4½ months previously, while striking an iron pipe with a sledge hammer. He stated that he felt a rather sharp pain in the eye immediately after the hammer struck the pipe. Quite soon the eye became painful and within a short time he noticed that his acuity of vision had been materially reduced. He was sent to a prominent local ophthalmologist who prescribed the usual local treatment. The eye quieted down decidedly, but the acuity of vision gradually diminished on account of a slowly developing cataract. Upon examination it was noted that the pupil was widely dilated from atropin and that the media was cloudy from an opaque lens and that a view of the fundus was impossible. A deep peri-corneal injection was present, suggesting an intra-ocular inflammation — oblique illumination revealed a tiny scar at about five o'clock at the corneo-scleral junction. With his history we were suspicious of an intra-ocular foreign body and an x-ray by Drs. Bell, Martin and McNeal was made, showing a foreign body of the size 1½ by 1½ by 1 mm.—6 mm. below the horizontal plane of the cornea. A second exposure horizontal section showed it to be 8 mm. to the temporal side of the vertical plane of the cornea. It was also located as being 9 mm. back of the center of the cornea.

This accurate and quite definite location of the foreign body decided for us the method of approach. Accordingly, under a local anesthetic, we made a scleral incision midway between the insertion of the external and interior rectus muscles and introduced the small point of a giant magnet into the wound. The foreign body, found to be a piece of steel and weighing ¼ grain, was readily removed. No complication followed. The pain in the eye and temple disappeared almost immediately and the eye rapidly became quiet. Eleven days later with eye free of inflammation, and having good perception and projection, we did a combined cataract extraction. No untoward results were encountered and two weeks later we needled the posterior capsule of the lens, resulting in a black pupil and the rest of the media clear. The indications are that useful reading vision will be secured.

Discussion:

OSCAR O. MILLER: One phase of this subject that impresses me as being very important is the prevention of eye injuries. In my opinion it should be mandatory for men engaged in occupations where they are liable to sustain eye injuries to wear goggles made of a special type of glass which does not shatter into fragments and which is comparatively inexpensive. Another lesson taught by this report is that an eye injury, no matter what its character, should be x-rayed promptly. This patient was treated for four and one-half months during which time the physician did not suspect the presence of a foreign body.

JOHN W. PRICE: I have had some experience with foreign bodies in the eye in former years and I simply wish to emphasize one point. It is the general practitioner, usually with very little experience in dealing with foreign bodies in the eye, who first sees these cases, and he should be impressed with the fact that it is important not to dilly-dally with them but send them to the eye specialist immediately. Successful treatment of a foreign body in the eye depends upon quick, accurate diagnosis and prompt operation.

Another point that should be borne in mind is that, even with the most prompt and efficient treatment, these cases are very capricious; they do not all act alike. You may have 10 cases with a successful outcome in every instance and then in the eleventh case, apparently no different from the others, the patient may lose the sight of both eyes. In such a case the eye surgeon should not blame himself unduly because it sometimes happens under the most prompt and scientific handling.

MORRIS FLEXNER: I would like to ask one question. I can understand that it may not be extremely difficult to remove a piece of steel from the vitreous with an electromagnet after it has been located, but suppose it were a birdshot in the same location, what would you do with it? Would you go in there and pick it out after it had been located?

J. GARLAND SHERRILL: I have seen Dr. Price and Dr. Grigsby do a number of eye operations and I have done some of them myself during our service in the late World War. One thing that impressed me at that time was the excellent and scientific treatment given the American soldier during the war. Every case of foreign body in the eye that came to the operating theater had previously been x-rayed and the position of the foreign body most accurately determined, which was done at that time by simply sliding the ray and angulating the patient. The ability to so accurately localize a foreign body in the eye is certainly a wonderful aid in the treatment of these patients.

C. T. WOLFE, (in closing). In the presence of any punctured wound of the eye the possibility of foreign body having entered should be considered and the value of an x-ray picture should always enter

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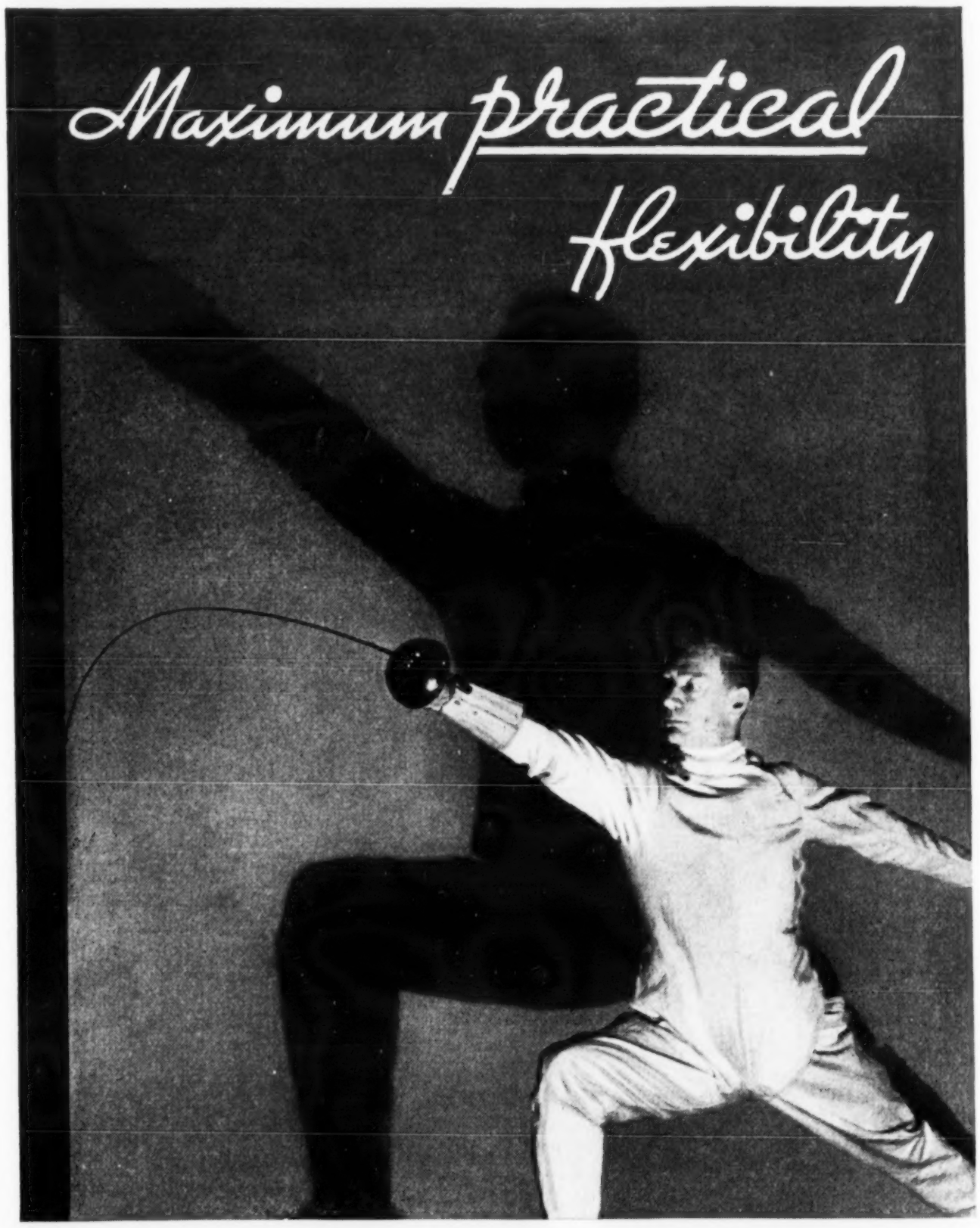

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our mind. In the case reported I was suspicious that a foreign body had entered the eye on account of corneal scar and a slowly developing cataract, the latter evidently traumatic in origin. There is no question that accurate localization is of great advantage in these cases. However, in the presence of a foreign body imbedded in the orbital tissue I would make no attempt to remove it. It is there and it is going to stay there, but it is not going to do any harm any more than a bullet imbedded in the thigh. The feature of special interest to me in this case was the fact that the foreign body had been in this man's eye 4½ months with constant pain and diminishing visual acuity as the result of the slowly developing cataract. Another important point was the method used in the extraction of the foreign body. If I had attempted to remove it by placing the blunt end of the magnet on the cornea and drawing it through the lens its sharp edges would probably have torn the lens and ciliary body. A number of years ago some authorities advocated removing foreign bodies through an incision in the sclera, but this method was attacked by many because of the danger of causing detachment of the retina, as they believed. Now we are sure that this procedure is not responsible for retinal detachment and is the method of choice in most instances if the foreign body is far back in the vitreous cavity. Such an incision was used in this case and the foreign body readily extracted by placing the tip of the magnet at the mouth of the wound. The prognosis after removal of any foreign body from the eye, whether recent or of long standing, is very uncertain. In this case the cataract has been removed, the eye is quiet and there is no pain. Vision in the other eye is normal 20/20, and as long as this continues he will not use the injured eye because under no circumstances will both eyes work in unison. The injured eye is of no use to the patient except possibly the detection of large objects, such as a horse or an automobile, approaching from his left side. However, if he should lose the vision in his good eye then he would depend upon the other one. Answering Dr. Flexner's question, there are seven or eight indications for enucleation of the eye and one of them is the presence of a foreign body that cannot be removed.

A Case of Contact Dermatitis Produced at a Distance

IN THE classification of skin diseases, contact dermatitis or dermatitis venenata appears as a clinical entity, separate from the more inclusive term eczema.* The chief reason advanced for this separation is that in contact dermatitis it is necessary to have actual physical contact between the causative agent and that portion of the skin involved. The case herewith presented demonstrates that contact dermatitis or dermatitis venenata may be produced by a sensitizing agent acting at a distance.

C. M., a man, aged 29, a truck driver, complained of a dermatitis present on the extensor surfaces of both hands and both feet. This had been present for the past six months. The patient stated that one and one-half years before he had had a similar ailment, which lasted for three months and disappeared. He had been driving a truck for six years, but only for the past one and a half years had he noted an eruption. At that time he took a trip into the country and two weeks later the eruption on both hands and feet disappeared. It had been present for 10 weeks previously. One year before admission he again began to drive a truck and six months later the eruption reappeared on the dorsum of the hands, where it remained for three months and then involved the dorsum of both feet. He complained of itching and burning of the areas involved, which were worse while he was at work or after he worked on his own automobile. Occcasionally the entire body would itch and burn, but most of the symptoms were limited to the hands and feet. His past history was negative for any allergic manifestations. His family history revealed that his mother had had hay fever and his father asthma.

Physical examination was not remarkable except for the skin lesions present on the dorsum of both hands and both feet. The eruption was characterized by scales, fissures and marked reddening. There were also some areas oozing a thin watery material.

The urine and blood count were within normal limits, and the blood Wassermann test was negative. Extensive skin tests with intracutaneous method were all negative. The usual common materials used in the patch tests were also negative.

He was then told to bring a sample of everything he handled while at work. Everything tested was negative. He mentioned that he was in the habit of washing his hands with gasoline when they were very dirty. He was told to bring a sample for the purpose of testing of each kind of gasoline he used. He brought Ethyl, X-70 and Renown gasolines. Each of these was placed in a separate one ounce glass container and the flexor surface of his forearm was placed over the openings of these bottles. Fifteen minutes later the Ethyl caused itching and burning, and the area of skin covering the open end of the bottle was reddened. Forty-five minutes later X-70 and Renown both showed the same effect. All the involved areas also showed the presence of blisters about six hours after contact with the gasoline. The itching and eruption caused by X-70 and Renown practically disappeared in 24 hours. That caused by Ethyl persisted for 48 hours. My arm, used as a control, was entirely normal. This reaction could very well explain the eruption on the dorsum of both hands, but could this explain the involvement of both feet? So far as the patient knew, his feet had not been in contact with gasoline. He was advised to discontinue work, and again his skin cleared. When he resumed his former work the lesions reappeared after an interval of three months.

The possibility presented itself that the dermatitis on the back of the feet might be due to a localization there of the excess gasoline absorbed elsewhere.

The following experiment was then performed: Each forearm was ex-

Applied 45 minutes Daily for 8 Days, Then Twice Daily	Time Observed	First Days' Observations	Second Through Seventh Days	Eighth Day	Ninth Through Eleventh Days	Twelfth Day	Thirteenth Day
Renown gasoline	15 minutes	Nothing remarkable	Practically the same as first day	Practically the same as the first day except that an eruption appeared in the popliteal areas; general symptoms also developed	Practically the same as eighth day	Eruption over all of healed areas as well as over both legs	Eruption spread over the entire body and generalized symptoms complained of
	45 minutes	Redness and itching					
	5 hours	Redness and itching lessened					
	6 hours	Blisters appeared					
	24 hours	Skin practically clear					
	48 hours	Skin clear					
X-70 gasoline	15 minutes	Nothing remarkable	Practically the same as first day	Practically the same as the first day except that an eruption appeared in the popliteal areas; general symptoms also developed	Practically the same as eighth day	Eruption over all of healed areas as well as over both legs	Eruption spread over the entire body and generalized symptoms complained of
	45 minutes	Redness and itching					
	5 hours	Redness and itching lessened					
	6 hours	Blisters appeared					
	24 hours	Skin practically clear					
	48 hours	Skin clear					
Ethyl gasoline	15 minutes	Itching and redness	Practically the same as first day	Practically the same as the first day except that an eruption appeared in the popliteal areas; general symptoms also developed	Practically the same as eighth day	Eruption over all of healed areas as well as over both legs	Eruption spread over the entire body and generalized symptoms complained of
	45 minutes	Intense itching and redness					
	5 hours	Blisters present					
	6 hours	Blisters and redness					
	24 hours	Blisters and redness					
	48 hours	Practically clear					

Experiments with three brands of gasoline used by patient

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* Dr. Joseph B. Biederman, Cincinnati, Ohio; from the Allergy Clinic, Cincinnati General Hospital, University of Cincinnati Medical College; in *J.A.M.A.*, June 27, 1936, pp. 2236-7.

posed daily for 45 minutes to the vapors given off from the three brands of gasoline he used, and the results are noted in the accompanying table. The first day, 15 minutes after the application of the ethyl gasoline, an itching and redness was noted on the patient's arm. Forty-five minutes after application all three areas itched to such an extent that the patient asked to have the experiment stopped. My forearms used as a control were not involved. Five hours later the redness was followed in another hour by blisters. The lesions caused by X-70 and Renown gasolines practically disappeared after 24 hours, while the lesions due to Ethyl gasoline lasted for 48 hours. The second day the same procedure was carried out on the other forearm, with practically the same results. This experiment was performed daily with the same results but using different clear spots on alternate arms until the eighth day, when an eruption appeared in the popliteal areas and he complained of "feeling miserable over his entire body" about the same time. He also complained simultaneously of a feeling of fullness in the joints. Nevertheless he asked to have the experiment continued. On the ninth, tenth, eleventh and twelfth days the same procedure was followed, except that the gasoline was applied twice a day instead of once. Until the time I would place the gasoline on alternate arms. When I alternated thus the lesions would disappear (except those caused by Ethyl) when I was again ready to use the same arm. On the twelfth day, however, the healed areas on the two arms erupted simultaneously with those on both legs. One day later, although no more gasoline vapors were contacted, the eruption spread over the entire body. The popliteal areas, the flexor surfaces of the forearms, and the axillae were most extensively involved. Fifteen minutes before the generalized eruption occurred, the patient stated that he felt as though needles were pricking his bones. Within two months the lesions had healed. He was told to avoid contact with gasoline and has been free from symptoms except on two different occasions when he has had definite exposure to gasoline.

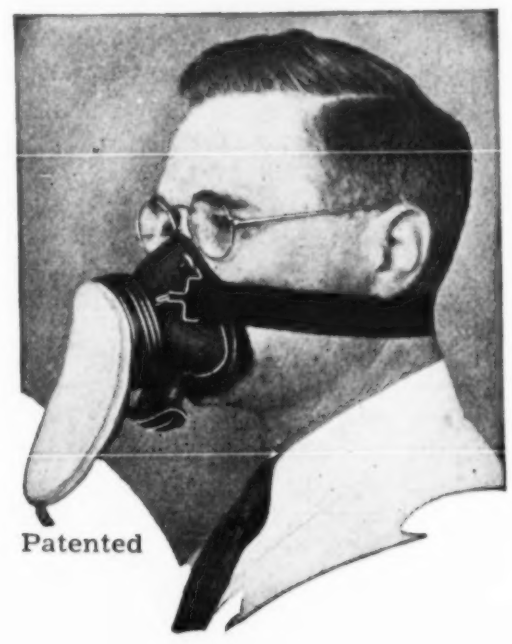
This case is reported to demonstrate that it is possible to have a so-called contact dermatitis caused by the responsible agent acting at a distance from the skin area involved. These studies suggest that after repeated exposure to a sensitizing agent the latter can be absorbed and affect other areas of the skin not in direct contact with the offending agent, where as smaller quantity may cause only a local lesion.

The Medical Department's Responsibility in Safety

THERE are many ways in which the nurse and surgeon can instill the lessons of safety and warn against the dangers of carelessness and neglect.* Men coming in with crushed toes can be told that safety shoes will prevent these badly lacerated toes by sustaining weight that with ordinary

* DR. ARCHE C. HALL, Chief Surgeon, Chrysler Corporation; from a talk before the Engineering Division, Detroit Industrial Safety Council, and published in *D.I.S.C.*, June, 1936.

United States Bureau of Mines approves Willson No. 400L Bag Respirator for LEAD DUSTS



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The Bureau of Mines has approved No. 400L "for protection against the inhalation of mechanically generated dusts whose main harmful constituent is lead, such as lead dusts generated in manufacturing storage batteries; enameling; pottery making; rubber compounding; sandpapering and chipping painted surfaces; paint making; preparing lithotransfers; and mining, milling and processing lead ores; and for protection against the inhalation of pneumoconiosis-producing or nuisance dusts, as quartz, asbestos, iron ores, cement, limestone, gypsum, coal, coke, charcoal, wood, cellulose, flour and aluminum."

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There is a sealed air passage between the filter bag and rubber face piece, making it impossible for even the finest dusts to gain entrance.

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Weighing only 5¼ ounces and having 40 square inches filtering area, these respirators are comfortable and very easy to breathe through.

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LOUISE E. BURNHAM.....Senior Clerk
EVELYN BRONSKI.....Junior Clerk

"IT SHALL be the duty of the Division to investigate conditions of occupation with reference to hazards to health and to determine the degree of such hazards, to investigate and evaluate methods for the control of such hazards to assist in the preparation of rules and regulations for the preventing of occupational accidents and diseases, and, in cooperation with the department of public health or otherwise, to promote occupational health and safety education."—Sec. 11A of the law creating the Division, effective 1934.

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shoes would cause the toes to be mashed into a pulp. In conjunction with eye injuries, examples of eyes lost because goggles were not worn can be emphasized, also cases where infected ulcerations have caused a loss of vision because someone in the department had attempted the unskillful removal of a foreign body with the resultant disastrous consequences. When men come in with minor injuries that have been infected, opportunity is given to warn them about early attention to minor wounds, for it is an established fact that some of the most horrible infections were not occasioned by the so-called major accidents, but by very trivial things that were neglected and self-treated until they reached such proportions that the function of the limb and life itself were at stake. But recently, three weeks after a very slight wound to the index finger, a man came to me with a self-treated virulent infection of the hand. He had a high temperature and was extremely ill. He was hospitalized at once, his hand was opened and drained. The original infection cleared up in a few days, but, by blood culture, it was found that there was a general septicaemia. The patient died a horrible death. Because happenings of this kind are not infrequently brought to the attention of the medical department, the industrial surgeon and the industrial nurse should instill into the men, their superintendents and the department heads the importance of coming immediately to the medical department at all times for treatment of even minor injuries.

The manner of handling injured men and the atmosphere surrounding them may have a far reaching effect. There will be the utmost gentleness in the treatment of all injuries because tissue should be handled gently and because no hospital must have the reputation of being unnecessarily rough. No wound is so trivial but that it must be given the most careful attention, no injury is so great but that it is handled in a calm efficient way. A proper amount of sympathy, should be extended but such expressions as "how horrible; the poor man will be crippled for life" have no place in the industrial hospital. Of course, it is true that many of the injuries received are horrible but, with the man already suffering and depressed from his injury, nothing but hope and a cheery influence should be extended him. Careless, unthoughtful remarks or unguarded exclamations, together with the consequences of the injury, may produce an influence on the patient that cannot be overcome. On the other hand, if the patient is properly handled, both surgically and psychologically, and the hope of rehabilitation is given him, the problem is never so complicated, and it is surprising how many men with injures that at first seem hopeless can be rehablitated and become useful again in industry.

Some years ago, I was surgeon for a thriving young industry employing some 350 men, and at the same time I was surgeon for another organization employing 15,000 men. The small industry had a well equipped plant hospital in charge of a very capable nurse, but the injuries were legion. There seemed to be no thought of anything but production, and there were more accidents in this small organization employing 350 men than in the plant that employed 15,000. I do not mean more accidents per capita, but more in number of a serious nature in the small plant than in the large one. By means of pressure exerted through the medical department, the situation was put squarely up to the management and they were persuaded to install a safety engineer, one who knew his job, and to back him to the limit. As a result, accidents decreased, the number of employees and production increased, and, when that same small industry grew until it employed 10,000 men, there were not 25% as many accidents as there were with only 350 employees. And to speak again of the larger organization with its 15,000 men; my association with this industry began when there were about 2,000 employees and when there was little safety. After this plant had grown to employ 15,000 with a well organized safety program there were fewer accidents than there had been when it employed 2,000. These are authentic examples of the accomplishment of the safety engineer and are only two of the hundreds that might be cited.

Some Aspects of the Problem of Silicosis

SILICOSIS is a disease of the lungs caused by breathing air containing silicia (SiO_2), characterized anatomically by generalized fibrotic changes and the development of miliary nodulation in both lungs and clinically by shortness of breath, decreased chest expansion, lessened capacity for work, absence of fever, increased susceptibility to tuberculosis (some or all of which symptoms may be present) and by characteristic x-ray findings.*

An individual who is developing silicosis may and often does not know when extensive changes have taken place in his lungs or that there is anything wrong with him. Approximately one-fourth of the men in the group of rock drillers studied in New York, whose chest x-rays showed advanced silicosis, had no complaints whatever and the same thing was true among the granite cutters. When symptoms do occur, shortness of breath is likely to be the first one noticed, and with it there may be a dry cough and some pain in the chest. There is usually no loss of weight in simple silicosis and no fever or malaise.

Incapacity from simple silicosis alone seldom occurs. It is almost invariably due to the superimposition of an infection, usually tuberculosis.

When tuberculosis develops in a silicotic individual his progress is, as a rule, rapidly down hill. This is borne out by the U. S. Public Health Service experience with the granite cutters at Barre, Vermont, where it was found that the median duration of one group of cases of tuberculosilicosis from the onset of disability to death was 15 months.

Silicosis Takes Many Years to Develop:

The Rate of Development of the disease depends on three factors (omitting the factor of personal susceptibility:

a. The intensity of dust, i.e., the amount of the air.

b. The content of quartz in the dust.

Industry	No. empl.	Source of figure	Estimated exposure to silica	
			Per cent	Number
Stone cutting	3,700	Occupation Statistics, New York, 1930	80	4,960
Mines and quarries, iron, sandstone, slate, granite, sand, talc.	1,739	Census of mines and quarries, 1929, Pennsylvania, New York, New Jersey.	80	1,391
Rockdrilling	5,000	Basedon Rock Drillers Union Local No. 250 figure for New York City.	100	5,000
Foundries	12,000	New York State Department of Labor.	80	9,600
Potteries	5,579	Census of Manufactures New York, 1929	50	2,789
Glass factories	3,148	Census Manufacturers, New York, 1929.	12	377
Soap, including: abrasive powder and appliances; cleaning and polishing preparations, mineral earths, ground or otherwise treated.	3,139	Census of Manufacturers	5	156
Asbestos	150	New York State Directory of Manufactures, 1932	50	75
Miscellaneous unestimatable:	.....	.....	.....	5,000
Sand blasting	.....	.....	.....	.....
Vitreous enamelling	.....	.....	.....	.....
Metal grinding	.....	.....	.....	.....
Excavating, etc.	.....	.....	.....	.....
Total	.....	.....	.....	27,348

*Dr. Leonard Greenburg, Executive Director. Division of Industrial Hygiene, in *The Industrial Bulletin*, State of New Yok Dept. of Labor, June 1936.

c. The duration of exposure (years of trade life).

The following is an estimate of probable silica dust exposure in New York State. It must, of course, be realized that these figures are only approximate.

Studies on the extent of silicosis in certain industries have been made by various investigators in different localities in the United States. It might seem possible to apply the figures obtained from such studies to the exposed population listed in an earlier portion of this statement. Unfortunately, this is not possible due to the enormous variations in incidence found in the various silicosis studies. These variations are without doubt due to the differences in trade conduct and working conditions in the different localities under study. For example, a study of granite cutters in New York State disclosed an incidence of 33% of workers while a similar study made in Barre, Vermont, showed an incidence of 66%. A study of the foundry industry in Wisconsin showed an incidence of 31% and a similar study made in Massachusetts disclosed an incidence of 11%.

Another reason why it is impossible to estimate the actual amount of silicosis is because in many of the industries listed earlier no studies on actual incidence have been made and therefore we have no incidence rates to apply to the exposed group (mines and quarries, glass industries, etc.).

This lack of fundamental data makes it imperative that studies on the incidence of silicosis in the industries of New York State be inaugurated at the earliest possible moment.

The prevention of silicosis consists in the installation and use of suitable efficient methods for the prevention of dust dissemination in industry.

Studies on dust control have been made in several industries, granite cutting, rock drilling and sandblasting. But only in rock drilling and in sandblasting have satisfactory techniques of prevention been evolved.

In the absence of such detailed studies on preventive methods, we are unable to provide industry with the information which is required for the design and installation of methods for the control of dust dissemination.

The need for detailed studies of dust suppression and removal devices must be obvious to the reader of this brief statement. Without this information we are powerless to aid industry in the solution of its problem and the protection of its workers. With the aid of such studies we can guide industry to the only possible solution, namely, prevention.

Occupational Disease Hazards

A CAREFUL survey made by the Division of Industrial Hygiene of New York state's department of labor is the basis for the following listing of certain occupational disease control problems in that state now requiring special attention:*

1. The plastics industry; problems arising in connection with phenol, formaldehyde and dust.
2. Various intermediary products

*From *Survey of Labor Law Administration*, U. S. Dept. of Labor, Division of Labor Standards, Vol. 1, No. 4, July 1, 1936.

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in the manufacture of aniline dyes, such as, A and B naphthylamine, analine and benzidine, causing malignant tumors of the bladder.

3. Halowax, a trade name covering about 100 different varieties of chlorinated naphthlene and chlorinated diphenyl. This material is used principally in the manufacture of electrical condensers and for the insulation of electrical wire.

4. Benzene derivatives such as orthodi-chlorbenzene used as an insecticide and para-di-chlorbenzene used in preservation of furs, etc.

5. Chlorine gassing among men engaged in connecting cylinders of compressed chlorine gas with water supply systems in certain cities and in connection with the manufacture of paper.

6. Poison ivy among field inspectors engaged in inspecting transmission lines for electric companies located in country districts where poison ivy abounds.

The Division of Industrial Hygiene, under Leonard Greenburg, M. D., executive director, has been experimenting with improved methods designed to control and minimize these hazards.

Michigan Association of Industrial Physicians and Surgeons

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Governor Signs Bills Making Silicosis Prevention Effective

THE campaign designed eventually to eliminate silicosis as a major industrial disease hazard in New York State received its greatest impetus on June 6 when Governor Herbert H. Lehman signed the following acts of the last Legislature:*

Senate Introductory Number 1084, Printed Number 1878, entitled: "AN ACT to amend the workmen's compensation law, in relation to occupational diseases and in relation to special provisions for compensation for certain injuries to the respiratory tract resulting from the inhalation of harmful dust, and to amend the labor law, in relation to control of harmful dust in public works."

Senate Introductory Number 1559, Printed Number 2063, entitled: "AN ACT to amend the workmen's compensation law, in relation to authorizing the expenditure of moneys from the vocational rehabilitation fund for the purposes of making studies, and of disseminating information on the subject of the control and prevention of diseases caused by the inhalation of harmful dust."

Assembly Introductory Number 1356, Printed Number 1508, entitled: "AN ACT making an appropriation to the department of labor for the prevention of silicosis and other dust diseases."

These laws became effective immediately.

Briefly, the outstanding features of this legislation are:

Provision for special and limited workmen's compensation to employees disabled by silicosis or other dust diseases.

Prohibiting so far as possible compulsory preemployment examinations of wage earners.

An allotment of $50,000 each year for five years to be spent for research studies on dust and other occupational disease from the viewpoint of prevention including the design of equipment, its operation, and studies on efficiency of apparatus in use.

Making mandatory the use of approved dust-eliminating devices and methods on all public works, including highways and construction both indoors and outdoors.

Directing the Industrial Commissioner and the Industrial Board to promulgate industrial code rules and regulations for the effective control of silicosis and similar disease in all industries and operations wherein silica dust and other harmful dust hazards are present.

Appropriation of $100,000 for administrative expenses and for employment of examining physicians and research consultants.

In approving the bills, Governor Lehman stated:

"These three bills were prepared by a committee consisting of representatives of industry, labor, insurance companies and of the Industrial Commission. Months and months of effort were devoted to them. These three bills represent their common agreement as to methods which they believe are soundly conceived to protect workingmen in industries affected by silicosis or other dust diseases.

"There is one feature of these bills which is of major significance. Its importance, in my opinion, outweighs any deficiencies that may exist in the legislation although I will frankly admit that certain provisions of this legislation are not at all to my liking and that they run counter to what I believe to be sound principles of workmen's compensation laws.

"But the protection of the workingman from exposure to conditions which develop silicosis and other dust diseases is a very long step forward. Hereafter, employers must use dust elimination devices approved by the Industrial Commissioner. This will be true both with respect to private employment and public projects. It should very greatly lessen the silicosis hazard and reduce disease and death resulting therefrom.

"An appropriation of $100,000 is made to enable the Industrial Commissioner to enforce this preventive requirement. Furthermore, it is provided that $50,000 annually commencing July 1, 1936, and extending to June 30, 1941, can be taken from the State Vocational Rehabilitation Fund for the purpose of making studies to prevent dust diseases, to devise methods of eliminating such hazards and to disseminate information to achieve the maximum degree of prevention.

"This feature of prevention, as I have indicated, is tremendously helpful from the long run social point of view. The benefits that will be obtained from effective prevention are of the greatest significance to present and future workers in these industries and of importance equal to that of providing compensation to the unfortunate worker who has been affected by silicosis or other dust disease.

"The President of the New York State Federation of Labor has urged me to approve these bills and has written to me as follows:

" 'I am writing to you in order that you may have Labor's thoughts in regard to three related bills now before you dealing with the Silicosis and Dust-disease hazards.

" 'These bills were drawn by a committee appointed by Industrial Commissioner Andrews, on which industry, labor and insurance people were represented. The appointment of this committee came about through an agreement made by all concerned during the all-inclusive occupations disease legislative hearing last year to the effect that silicosis and dust disease hazards should be the subject of special legislation.

" 'A distressing situation was created by the insurance carriers who not only insisted that the employer pay a prohibitive preminum on dust hazard occupations, but also insisted on a physical and medical examination of all employees covered. Whenever the history of the employee indicated previous contact with harmful dusts, he was denied employment irrespective of his physical condition on the theory that he might possibly bring some accrued liability to the risk. This policy of the insurance carriers was resented not only by the

*From *The Industrial Bulletin*, State of New York Dept. of Labor, June, 1936.

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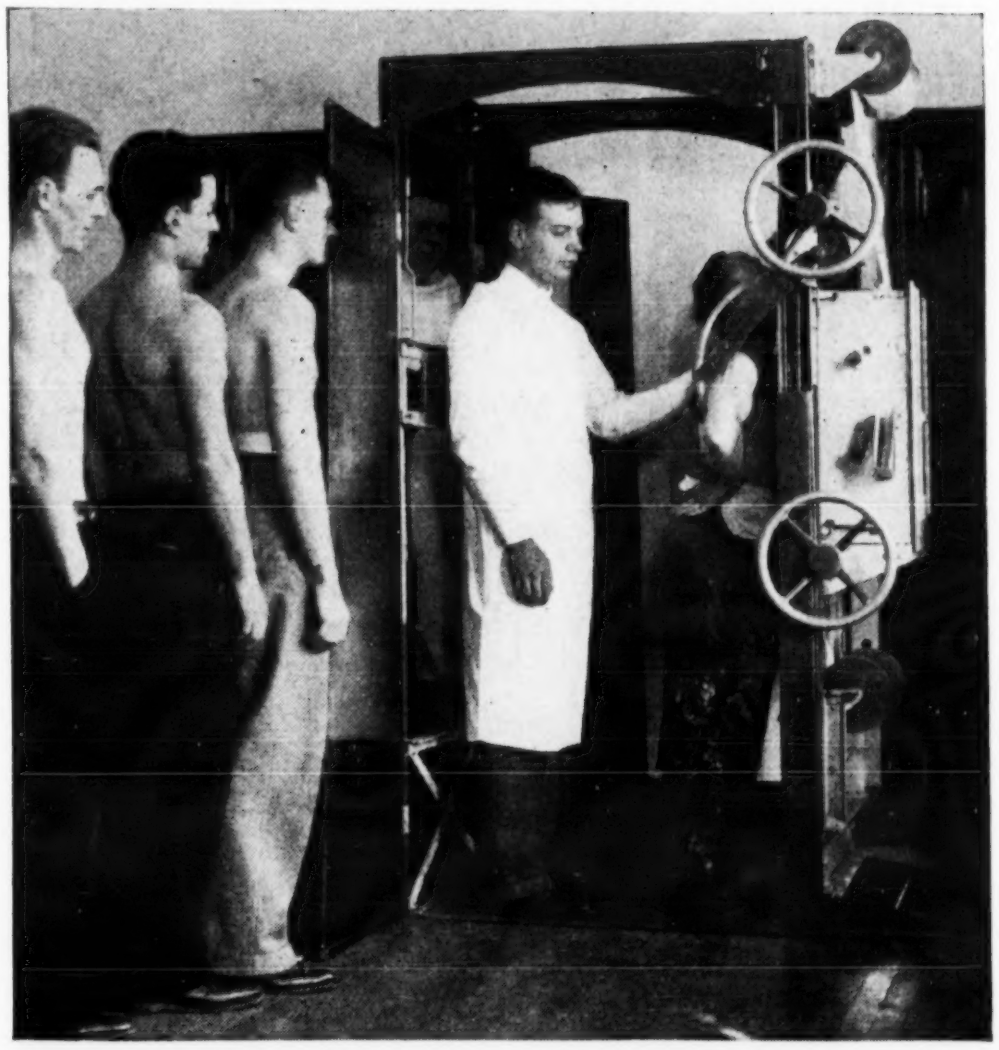

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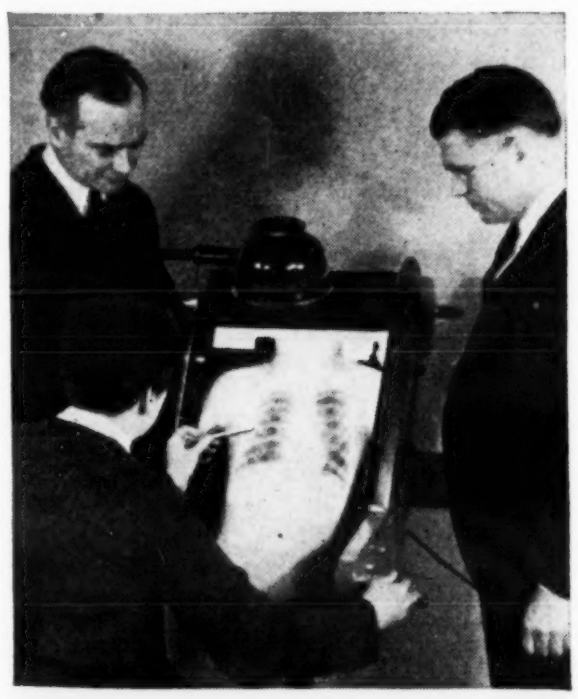

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employees, but by the employers of the State of New York.

" 'Because of this unjustified policy of the insurance carriers in the dust industries, we found after September 1, 1935, that thousands of men were denied employment and that hundreds of employers faced a complete shut-down. This brought us face to face with the problem of finding a method by which these men who had spent their lives in these industries could be returned to work.

" 'However, there was another problem of far higher importance to the organized labor movement and that was the question of preventing further loss of life and health through inhalation of harmful dusts. Labor has always considered the question of prevention as being paramount to any economic angle presented by compensation legislation.

" 'These bills now before you for action represent a fair compromise between labor and industry insofar as the financial and economic aspect of the silicosis compensation problem is concerned. They provide an opportunity for men in these trades to return to work and they enable employers to again pursue their business by the payment of a reasonable premium in order to insure their employees against dust hazards.

" 'Let me emphasize that on the question of prevention of these dust diseases, these bills do not represent a compromise. If these bills are signed by you it will not be possible for any employer in this state to subject his employees to harmful dust hazards without using dust elimination devices approved by the Industrial Commissioner. This applies to all public work as well as to all private work. It is our strong belief that this provision in the law represents the first real practical attack on the silicosis hazard and is the most important feature of these bills now before you.

" 'Therefore, I am most respectfully requesting you on behalf of the New York State Federation of Labor, and specifically on behalf of the particular workers concerned with the silicosis problem, to approve these three bills in order that New York State may take the lead in an intelligent campaign to eliminate the dreadful hazards connected with the so-called harmful dust industries.'

"The bills are approved."

The problem of silicosis and other dust diseases is a complex and difficult one, involving as it does specialized medical and engineering knowledge, varied industrial processes and working conditions and compensation liability incurred over periods of from five to 25 years. At the 1935 session of the Legislature a bill was passed which also provided special limited compensation for silicosis. Immediately, employers and insurance companies, who had presumably agreed to the bill while it was under consideration, expressed panic lest the bill, if signed by the Governor, would saddle the dusty industries with accrued liabilities requiring insurance deposits and premiums which the employers could not possibly pay. Employers in the foundry and stone industries particularly declared that they would be unable to continue operations because they would be required to make deposits of from $300 to $600 per employee, and in addition to pay insurance premiums increased three and four fold. Heeding the plea that these industries and employment therein could not be continued if the bill became a law, Governor Lehman disapproved it, remarking that silicosis and other dust diseases would be covered in any event under the all-inclusive occupational disease amendment to the Workmen's Compensation Law.

The all-inclusive occupational disease amendement became effective Sept. 1, 1935. Before and after that date, there was a tendency among insurance companies to require covered employers to have their employees examined, presumably in order to eliminate those who were suffering from silicosis and other occupational diseases. This practice was discouraged by the industrial commissioner as much as possible. But insurance companies, arguing that they had a duty to protect their stockholders against unknown and possibly heavy liabilities, continued to press for physical examinations of employees, particularly in those industries and plants in which a serious dust hazard existed. Estimates of the possible accrued liability varied widely. The highest estimate for the entire State was $10,000,000. It is believed this figure was fantastically high and that, in practice, the actual cost of awards for disability due to silicosis and other dust diseases would be considerably less than the estimates. But the trouble was and is that there does not exist a sufficient basis of exact knowledge on which to combat the high estimates and to establish compensation insurance rates on a scientific basis. Actuaries have had to resort to guess work and in their guesses they naturally have been inclined to protect their employers, the insurance companies, against possible loss.

Several months ago, the State was faced with a crisis in the dust hazard industries. Old employees were threatened with physical examinations and possibly loss of jobs. They and their representatives were unable to rebut the argument that insurance companies must know the extent of the liabilities they were being asked to insure. Without physical examinations, the insurance rates offered were so high that employers declared they would have to discontinue operations. At this point, a series of conferences between representatives of employers, insurance companies, and employees was begun. The purpose was to work out some sort of method whereby the dust hazard industries could continue to operate without throwing old employees out of work, and at insurance rates which would not increase the cost of operation above the level of competition with employers in adjoining States which do not offer any compensation for silicosis and other dust diseases. While these conferences were in progress, a sort of stand-still agreement was reached, whereby operations and the employment of the older and more experienced workers were continued. The State Insurance Fund, at Commissioner Andrews' direction, offered group insurance at cost to foundries and other groups in the dust hazard field.

Although the bill, now become law, represents a limitation in the maximum amounts of compensation to be paid workers disabled by dust diseases, it may be pointed out that the maximum of $3,000 is exactly $3,000 more than is offered to workers disabled by this disease in most of the other States. While this limited compensation seems necessary now, it is believed that, as experience with claims for compensation for silicosis is built up in the near future, and as the campaign for prevention now provided for is pushed vigorously, it will be possible to increase the maximum awards.

Proposals have been made for Federal subsidies to encourage prevention of dust diseases in the various States and the setting up of some compensation coverage for those disabled by such diseases. This would be of great assistance in liberalizing the provisions of the new law.

Employees in the dust hazard industries who, through their representatives, have agreed to the limiting of compensation for total disability to a maximum of $3,000 and a maximum period of medical treatment of 180 days, while waiving compensation for partial disability, have done so because they prefer to keep their jobs at full wages rather than to run the risk of losing them while holding to rights to full compensation given under the all-inclusive occupational disease amendment.

The New York State Department of Labor has been cognizant of the dust hazard problem for some years. It has conducted field studies on this subject and has printed pamphlets describing silicosis. The chief trouble has been that lack of funds, which now will be forthcoming, has prevented the department from inaugurating a wide program of prevention in industry.

The Department of Labor will now bend every energy and resource to the speedy lessening and final elimination of the dust hazards. This is the first job. It has already been started. As rapidly as it is accomplished, rates should be decreased and it is hoped that within a few years maximum compensation for silicosis and other dust diseases may be increased, until there is no distinction between compensation for dust diseases and that now given for other occupational diseases and industrial accidents.

The new law provides that "all claims for compensation resulting from inhalation of harmful dust, where the last exposure occurred between the effective date of this act and Sept. 1, 1935, shall be barred unless filed within 180 days from the day on which this act takes effect."

The provision for compensation for total disability or death due to silicosis or other dust diseases, provides, "If disablement or death occur during the first calendar month in which this act becomes effective, not exceeding the sum of five hundred dollars; thereafter the total of compensation and benefits payable for disability and death shall increase at the rate of fifty dollars each calendar month. In no event shall such compensation exceed an aggregate total of three thousand dollars. The aggregate amount payable shall be determined by the total amount payable in the month in which disablement or death occurs."

The bill provides that "If an employee, at the time of his employment, falsely represents in writing that he has not previously been disabled from the disease which is the cause of disability or death or has not received compensation or benefits under this Article, no compensation shall be payable."

The new "Article 4-A" which is inserted in the Workmen's Compensation Law, opens with this statement of policy:

"§ 65. Prevention of silicosis and other dust diseases. 1. It is hereby declared to be the policy of the legislature of this state, in enacting this article, to prohibit, through every lawful means available, any requirement as a pre-requisite to employment which compels an applicant for employment in any occupation coming within the purview of this Article to undergo a medical examination.

"2. The Industrial Commissioner and the Industrial Board are hereby required to add to the Industrial Code, as provided in Section 29 of the Labor Law, effective rules and regulations governing the installation, maintenance and effective operation in all industries and operations wherein silica dust or other harmful dust hazard is present, of approved devices designed to eliminate such harmful dusts and to promulgate such other regulations as will effectively control the incidence of silicosis and similar diseases."

The bill amends the Labor Law by inserting a section requiring that each contract for the construction of public works shall contain a provision requiring the installation, maintenance, and effective operation of approved appliances and methods for the elimination of harmful dusts. Noncompliance would void the contract.

It is the purpose to adopt a merit rating schedule through which the cost of coverage will reflect the degree of prevention. This progressive cooperative venture on the part of two State departments and the Compensation Rating Board brings about for the first time in the history of the State a unification of safety standards and prevention methods by which all inspection services both public and private will be guided.

Coverage already has had the effect of stimulating dust prevention. A money motive has been given. The stimulus will still hold under the new law.

In addition, prevention is now promoted under broader and stronger provisions in the Labor Law and by larger appropriations. Use of approved apparatus and methods of prevention will result in lower insurance rates through merit rating of plants.

Occupational Dust Diseases

IT HAS been estimated that 1,200,000 workers are exposed continually to serious dust hazards. The large number of those affected is often offered as a reason for hesitation in dealing with the problem. To offer such a reason is, in effect, to say, "We can't do anything about it because there are so many of them." But the greater the number of people who are affected by a problem, the greater the need for prompt and satisfactory efforts at solution.

Dust hazards are caused by a variety of substances used in manufacture, or found in mining and other operations. Among these are asbestos, coal dust, talc, and silica.

By far the largest group of workers exposed to any of these hazards are those in occupations where silica dust prevails. This dust is the cause of the disease identified as silicosis. Dust diseases of the respiratory tract have in general been included under the term pneumoconiosis.

Exposures to the disease, so far as the dust conditions themselves are concerned, are governed by several factors. Included in these elements are the size of the dust particles, the intensity of the dust, and the percentage of free silica present in the dust.

Dust particles of 10 microns or larger are negligible as a cause of trouble, as they are filtered out by the upper respiratory channels. The micron, the unit of measurement used for this purpose, is one twenty-five thousandth of an inch. In an analysis of dust in the anthracite mines of Pennsylvania, the particles were found to be practically all less than four microns. Eighty per cent of them were between one-half micron and one and one-half microns. This dust was, therefore, of a size small enough to be breathed into the air passages of the lungs.

No danger exists where there are less than five million particles of dust per cubic feet of air. From this point the hazard increases in proportion to the silica content of the dust. The number of cases remain negligible where there are less than 50 million dust particles to the cubic foot of air if the dust does not contain more than 5% of free silica.

Rock-workers in the Pennsylvania mines were found to be exposed to dust containing 35% of free silica. Among various groups of such workers, it was found that of those employed less than 15 years in concentrations of not more than 200 million dust particles to the cubic foot of air, 10% contracted silicosis. Of those employed more than 25 years in dust where there were 300 million particles to the cubic foot of air, 92% developed silicosis.

Nine states have laws establishing general coverage on occupational diseases.

These states include California, Connecticut, Massachusetts, New York, North Dakota, Wisconsin, Wyoming. Illinois and Rhode Island adopted such laws in March of the present year. The District of Columbia, the Philippines, and Hawaii also have general coverage provisions, as do the two Federal Acts; the U. S. Civil Service Compensation Act, and the Federal Longshoremen's and Harbor Worker's Act. The New York law was amended at the last session of the legislature so as to limit the total compensation in silicosis cases to a total of $3,000. Kentucky and West Virginia have acts containing elective provisions. Unless both employers and employees elect to come in under this section of these acts, silicosis cases remain as before, subject to adjudication under the accepted common law standards.

Methods already in use have been conclusively shown to be capable of reducing the hazard to a minimum compared with its present prevalence.

Thus, as the result of a preventive program instituted in 1927 under the supervision of the United States Bureau of Mines in the tri-state zinc and lead mining district of Kansas, Oklahoma, and Missouri silicosis with tuberculosis decreased 66.55%, and tuberculosis declined 82.70%.

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*From an Address by OWEN B. HUNT, Commissioner of Insurance. State of Pennsylvania, at the Convention of the National Association of Insurance Commissioners, St. Paul, Minn., June 8-12, 1936; published in *Journal of American Insurance*, June, 1936.

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The Eye in Industry

IT MAY seem a truism to say that without eyes the could be no industry.* It may seem equally absurd to state that without light the best eyes are useless. Yet upon these two facts depends the entire industrial fabric, and not that alone, but life itself.

As I see it, this subject of the eyes in industry may be well divided into three groups: First, in its relation to the employer; second, in its relation to the employee; third, in its medico-legal aspect.

THE great source of light is the sun. Man, in the process of evolution, adapted his eyes to the sunlight, and it became for human beings the most perfect illumination. During the ages, and keeping pace with his social, spiritual and material uplift man has utilized his ingenuity in producing artificial methods of illumination. With the changes produced by the advance of modern industrial civilization, many forms of light have been invented to take care of individual requirements. Crowding has taken place in great centers of industry so that our buildings have become ever higher and higher and closer together, shutting out the most perfect light, that of the sun, so that it has become necessary to replace it with light from other sources. This in itself has produced problems of which the aboriginal man never dreamed. Then again, modern civilized man uses his eyes constantly for work close to him, a condition for which the human eye is not perfectly adapted. So we are constantly forced to use our eyes in a way nature did not intend, under lighting conditions which are at best not perfect.

We know that fatigue is a common cause of disease, and fatigue of the eyes is a principal factor in many industrial accidents. It is a cause of much inefficiency in workers, from headache, loss of time, spoiling of materials, etc. Consequently, it is a source of direct monetary loss to both employer and employee. It is only comparatively recently that much attention has been paid to the conditions under which our eyes are to be used. Light may be so dim that objects can be seen only with difficulty, or it may be so strong that it exhausts the powers of the retina to a point where the eye is totally incapacitated. We try to reach a happy medium where our work can be well done with as little fatigue as possible. But, remember that we cannot judge by the brightness of the light alone, but by its effect on the individual while working at his particular task. We have instruments for measuring the amount of light, but in the last analysis the effect of the light on the individual is the final test. Some eyes require more light than others, particularly with advancing years, and some occupations require more light than others.

* James H. Andrew, M.D., F.A.C.S.; presented at the Institute on Conservation of Vision, Brooklyn, N.Y., April 16, 1936; arranged by the Bureau of Prevention of Blindness of the Division of the Blind, New York State Department of Social Welfare; and sponsored by the Eyesight Conservation Committee of the Brooklyn Health Council; Medical Society, County of Kings and Academy of Medicine; and the Brooklyn Ophthalmological Society; published in *The Sight Saving Review*, June, 1936.

The pupil of the eye dilates or contracts automatically to allow just so much light to fall on the retina, but a sudden change from a bright light to a dim one, or vice versa, causes a marked failing of visual power for an appreciable time. The intensity of a light depends also on the luminosity of surrounding objects. The light of a match in a dark room may be positively painful; an automobile headlight at night is another common illustration of this fact. It is a mistake, therefore, to attempt work with a bright light shining in the eyes. Daylight reduces shadows to a minimum because it is so thoroughly diffused. Artificial light, because of its great intensity and poor diffusion, causes deep shadows; and these deep shadows are sometimes the cause of industrial accidents. If light falls directly into the eye, or is reflected into it from a polished surface—a condition known as glare—the effect is the same.

And glare is particularly bad when it strike the eyes from below, as from polished desks, polished machinery, or water.

A factory, where land is cheap, built of one story with saw-tooth skylights facing the north, as you have sometimes seen, is almost ideal, as northern light is more uniform throughout the year and has a great volume but not a high intensity. Our modern illuminating engineers have done much to reduce the intensity of electric light and increase its diffusion, making conditions more nearly approximating a good north light. So if you contemplate putting up new office buildings or factories, or remodeling old ones, it is well to get advice about the lighting from a competent illuminating engineer.

Another contributing cause of suffering, loss of time, spoiling of material, compensation, etc., is faulty vision. How often do we employ workers, particularly those whose occupations are hazardous, without knowing the condition of their eyes? How much worry, suffering, and litigation could be avoided if we knew the condition of each worker's eyes before employing him? For example, you employ a color-blind chauffeur; he passes a red light not realizing that it is red, strikes another car or a pedestrian, causing a loss of life. Would not it have been better to have known about that color-blindness, and saved life and money by employing another man whose eyesight was good? Suppose you employ a mechanic to work on a complicated machine, and find out after much work has been ruined that the man sees well with only one eye as so many of us do, and has no depth perception. Would not it have been better to have known the condition of his eyes before hand and saved money, material, and perhaps a ruined machine by giving him a job where fine distinctions were not necessary? In certain diseases the fields of vision are restricted; the patient can see only directly ahead but not to the sides. Such a condition is particularly hazardous because of danger to bystanders as well as to the individual himself. A comparatively few large industrial concerns do examine their applicants' eyes before they employ them, and then have them re-examined periodically, but I believe such concerns to be in the minority. I fancy they find it cheaper to lock the barn before the horse is stolen. When I speak of examining the applicants' eyes, I do not mean a perfunctory examination for glasses by an eye-glass vendor but insist that such an examination should be made by a qualified physician whose training enables him to detect diseases of the eyes, in their incipiency. I should also advise that records be permanently kept of the condition of the eyes, noting every abnormality. I shall refer to this under the medico-legal aspect.

NOW let us take the point of the employee. After the most careful examination and correction of his eyes, working in a shop where every precaution against accident is taken, we know that occasionally, in spite of fate, accidents do happen. They may be trivial or they may be serious. From a humanitarian point of view—to say nothing of the economic one—a faithful worker deserves the best care that we can give him. The majority of such accidents are fortunately trivial, and can be avoided by any one who will take the trouble to learn a little first aid. It is needless to say that serious accidents, or even those that are questionable, should be placed in the hands of physicians specially trained to care for the eyes.

The commonest form of injury is the ordinary speck of dirt, or emery, or whatnot that lodges on the eyeball or gets under the eyelid. These accidents may cause the most acute suffering, and by reason of infection carried with the foreign body, or by reason of germs getting into the abrasion that such substances cause, serious ulcers of the cornea may and do occur, with loss of the eye. There is usually some workman in every shop skilled in removal of such particles, using a sharply pointed knife, sharp nail, or some other object. Sometimes this knife or nail is carried in his hip pocket along with his chewing tobacco or dirty handkerchief. Needless to say, such instruments are never sterile and may cause infection in an eye which would be otherwise safe. Do not let Bill or Jack fool with these foreign bodies with his knife or nail. Such attempts should be followed by instant dismissal. A little piece of sterile cotton wound tightly on a toothpick will usually remove specks easily—even the corner of a clean handkerchief will do. Turning over the upper eyelid to brush off particles adhering to its under side is easily learned, and everybody should know how to to it. If the particle does not come away easily, the patient should be put in expert hands.

All sorts of grinding and polishing processes are liable to cause eye injuries, usually of a superficial character. Bits of steel, emery, or polishing powders may get into the eye. These can be taken care of by removal as suggested before, washing, etc. It is always safe to put a drop of the ordinary 2% mercurochrome solution in these eyes. This has the advantage of being found in many shops, is perfectly safe to use, and is a fair antiseptic. Its disadvantage is that it colors the skin red, but this stain is easily removed by water if done at once.

Explosions of gunpowder, dynamite, etc., may cause loss of one or both eyes or may cause the skin and conjunctiva (the membrane which covers the eyeballs and lines the lids) to be peppered with grains of powder. The grains of powder in the skin can often be helped by applying peroxide of hydrogen immediately. In the eyeball, they are best removed by an eye surgeon; if there is a delay, it it well to wash the eyes with a solution of boric acid, a teaspoonful to a glass of warm water. Cold applications applied over the closed lids, wet gauze or a wet clean handkerchief also help prevent inflammation.

Iron and steel workers show the largest percentage of industrial accidents, most of which may be prevented by wearing spectacles or goggles. The isinglass goggles are worthless because they are difficult to see through. Men working at chipping castings, turning on lathes, and grinding tools should always be protected by glasses, and the best glasses are the shatter-proof ones, although broken spectacle lenses almost never injure the eyes. The frames help hold the broken glass, and nature has provided natural defenses in the projection of the eyebrows, nose, and cheeks, as well as by the eyelids which automatically close so fast that they offer a great protection. Goggles purchased should conform to specifications of the National Safety Code.

It is very common to have chips of steel, sometimes only a millimeter or two in diameter, shot into the eyes with sufficient force to penetrate the eye, lodging inside the ball or even going through the globe into the orbit. Sometimes these particles go through the iris, causing tears, and through the lens, causing cataract, or even injuring the retinal and choroid coats, causing serious hemorrhages. Sometimes the wound of entrance is so minute that it can be seen only with a strong magnification. If there is the slightest question, an x-ray should be taken. With our present means of localization, the exact position of the steel can be seen, and the particle can be extracted by means of the electro-magnet. If it is left in the eye, the steel rusts, causing a change of color in the eye and frequently rapid inflammation and breaking down of the tissues of the eye.

Particles of copper and brass less commonly are forced into the eyeballs because they are softer and not brittle and do not chip off so easily. Striking a cold chisel with a hammer has caused the greatest number of accidents that I have seen, pieces of the chisel or hammer breaking off and flying into the eye. Cheap hammers are usually responsible. The best hammers, thoroughly hardened, are the only ones safe to use. These particles go into the eye very hot and are not so likely to cause infection as are pieces of stone, mortar, or brick, which go in comparatively cold and carry infection for that reason.

We get many chemical injuries to the eye. Perhaps the commonest are alkali burns from slacking lime and plaster. Alkali burns are frequently worse than acid burns because the alkali continues to burn, whereas acid

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is soon diluted and neutralized by the tears. The first aid treatment of alkali burns such as those caused by ammonia, lye, lime, plaster, etc., is to put the victim on his back, open the eyelids, and pour warm water in large amounts into the eyes until expert help can be gotten. If you have vinegar handy, a few drops may be added to the water to help neutralize the acid.

Bottlers of aerated beverages are sometimes injured by broken glass, as are bartenders. X-ray pictures do not show glass unless it is lead glass, or rarely flint glass when the rays of light just catch the edge of the glass.

In any of these industrial accidents, frequently the object causing the injury has less to do with the destruction of sight than the germs which may be in the eyes, or which are introduced by dirty implements used in its removal or by dirty dressings applied to the eyes. Small packages of sterilized gauze, large enough for one dressing, sealed in envelopes and not opned until they are placed on the eye, and a tube of sterile vaseline to be used but once, should be in every shop where eye accidents are likely to occur. These pads can be fastened in place with strips of adhesive plaster, or can be covered with a black fabric eye pad. Never, under any circumstances, use a celluloid eye shield, for because of its inflammable nature, it may cause serious burns through ignition by a carelessly lighted cigarette.

BEFORE taking up the medicolegal aspect I would like to amplify the suggestion previously made of the importance of a complete eye examination by an eye surgeon, before employing any worker, from the point of view of efficiency, accident prevention, and consideration of disability other than accident, as well as the avoidance of demands on the pension fund of the organization. The reasons for this examination are: First, to prove that he is physically competent to do the work; second, that any pathological conditions which may be progressive, or which might be aggravated by minor injury or strain are not present, or if they are present, that they are a matter of record for consideration if their presence becomes a matter of importance in connection with a claim for compensation; and third, that the employee be given proper advice concerning any determinable tendency or inherent weakness so that he may take proper care to avoid disability.

A complete examination of the eyes may easily be the most important part of a physical examination because it determines the employee's ability to see, which is likely to be a determining factor in his efficiency. Then again, such an examination may reveal conditions of the general health which are overlooked in an ordinary physical examination. For instance, unsuspected kidney disease, diabetes, brain tumor, syphilis, and tuberculosis are often picked up by the ophthalmologist without the aid of a general physical examination.

I would stress also the importance of regular and systematic eye examinations, for the reason that the eyes change with advancing years, and because a man has good eyes at the time of the original examination is no criterion of what he may have in the succeeding years.

UNDER our present compensation laws when an employee receives any kind of injury, there are certain important considerations which may determine the cost to the employer. First, the kind of first aid treatment he receives immediately, and the competence of the treatment he receives subsequently; second, the extent of the damage done by the injury, which may easily be mitigated or even increased by the kind of treatment he has received; third, the aggravation of an existing pathological condition which may have been progressive in itself, and which might have caused blindness even without the injury. One constantly meets compensation cases where partial or total loss of vision is claimed, when, without a doubt, a pre-existing disease or scar from a previous injury has been taken advantage of to magnify the claims for compensation.

After the ophthalmological examination and the protection of the eyes by proper shatter-proof goggles, guards for machinery, etc., the next important consideration is the seeing conditions under which the employee works. The efficiency of a worker depends on the kind of illumination he receives. Accumulations of dirt on light bulbs and fixtures reduce the illumination and a little soap and water will remedy this trouble. So also dirty, drab surroundings absorb a proportion of light. Glare from unshielded drop cord bulbs within the range of vision, and from polished desks and machines, is easily taken care of, and its elimination adds to the workers' efficiency and decreases the accident hazard.

The medicolegal aspect of eye injuries is an absorbing and important subject which I shall have time only to touch upon but is one which comes very close to the hearts and pocketbooks of both employer and employee.

First, let us take up wounds of the eye, eyebrow, eyelids, etc. They, like all other wounds, may be contused, incised, punctured, or lacerated.

Contused wounds of the external coverings of the eye are usually manifested by what is known as a black eye, ordinarily of slight importance, but occasionally sufficiently severe to injure the periosteum or membrane which covers the bone, where abscesses may ensue causing destruction of the eye. A contusion of the eye itself may cause rupture of the globe, cataract, dislocation of the lens, or detachment of the retina. It is important, therefore, to have a thorough ophthalmological examination of such cases immediately.

Incised wounds of the eyelids, brow, etc., are clean-cut and, in the absence of infection, heal readily without much scarring. However, if the edge of the lid is split, the tissues retract leaving a V-shaped deformity, unless skillfully sutured. The fibers of the levator muscle—that muscle which elevates the upper lid—may

be severed, causing permanent drooping of the lid. If the two ends of the muscle are found and sutured, no such deformity takes place.

Incised wounds of the eyeball may affect only the membrane covering the eye in which case little damage is done; or they may injure the cornea or deeper structures which is a serious matter.

Punctured wounds are inflicted by slender objects: lead pencils, pens, sharp slender tools, etc. These wounds present two difficulties: First, the danger of breaking off a point of the instrument and its retention in the wound; second, the danger of infection—for we can safely consider that such wounds have carried into them ordinary germs of sepsis, and sometimes the germs of tetanus. The germs of tetanus develop in such wounds because of the exclusion of air. These wounds should be thoroughly cleaned down to the bottom, and injections of anti-tetanus vaccine given. If such a wound occurs in the globe itself, the patient should be hospitalized under expert care immediately.

Wounds of the cornea may be abrasions involving only the superficial layer, or they may be deep. The danger of even the superficial ones is that of infection and corneal ulcers.

Foreign bodies in the globe should receive intelligent first aid, then x-ray localization; and if magnetic, immediate extraction by the electromagnet, for the retention of a foreign body in the eye is a potential source of danger so long as it remains there.

Having done everything possible for the injured man and having perhaps saved his sight, have we gotten over all our troubles? By no means, for while I have the greatest admiration for the legal profession, there are black sheep in it, as in every other profession or business, and an accident case is like manna from heaven to some of them. They get in touch with the injured man and persuade him that his injuries should receive more compensation than he is getting, and if he happens to be the type of man who will yield to their persuasions, the employer faces litigation or increased compensation claims. This is done in three ways: First, by simulation or feigning of injury that had no existence in fact; second, by attributing to injury an actually existing disease or injury that had occurred previously, leaving some damage; third, by trying to exaggerate the amount of injury that did exist.

For instance, blindness of both eyes may be alleged. This is hard to get away with. A simple test is to close the eyes, extend one of the claimant's arms asking him to touch the tips of the fingers with the tips of the fingers of the other hand. If he is faking, he will not do this, but we know that the really blind have no trouble doing it. The eye specialist has other tests which he can make.

Blindness in one eye is easier to get away with. A simple test is to give him a book, or better, a page of numbers, place a pen or pencil vertically in front of the nose a few inches from the eyes. If he reads all the letters or numbers, he must be seeing with the allegedly blind eye because the pencil or pen shuts out some of the letters or numbers from each eye but allows the other eye to see them. There are numerous other tests.

A man may receive a blow from a fist cutting his eyebrow and try to attribute this to an injury in the shop. Such cuts are usually caused by the underlying bone, and because of that are longer underneath than on the surface. They are likely to have discolored edges, and the tissues are more or less ragged. A wound caused by a tool or instrument is longer on its outer surface than beneath and has sharply marked edges which are not so likely to be discolored.

There is a condition known as coloboma of the iris, showing a keyhole shaped pupil usually in the lower part of the iris, which is congenital and which is sometimes accompanied by blindness. Such condition has sometimes been falsely attributed to injury.

A condition known as pterygium, where the conjunctiva overgrows the cornea, is common in men who lead an outdoor life, sailors, truck drivers, etc. A similar condition sometimes occurs from injury, and occasionally a man with a natural pterygium will try to claim that it resulted from injury. A probe can be passed under a natural pterygium but not under a traumatic one.

A senile cataract or a diabetic one is sometimes palmed off as cataract resulting from injury.

I have recited just a few conditions that may arise in these compensation cases—though the list is limited only by the ingenuity of the claimant and his lawyer—in order to impress upon you the necessity of knowing, and having on record, the exact condition of the worker's eyes from the day of his employment, through the years, until his service is terminated. Such knowledge will save much money and many a headache.

Is Disease Dominant In Our Destiny?

DURING the winter of 1923 a professor, famous for his studies on paresis, was lecturing to his students at Moscow.* Suddenly the door opened and a group of men in the uniform of the Secret Police entered. Their leader turned to the lecturer and said, "Stop your lecture and come with us." The professor turned white. He knew of many people who had gone off with the Secret Police and never returned. "May I telephone my family?" he pleaded. The leader of the Secret Police laughed. "We are not going to harm you. Come on."

They walked a short distance, then entered an airplane and flew to a country estate, several miles outside Moscow. Here in the mansion of the former owner lay a man on a simple bed, unable to speak intelligently and apparently paralyzed. The professor recognized Nikolay Lenin, Russian dictator, who did not hesitate to shed oceans of blood to advance the cause of Bolshevism. Here lay the high priest of a new religion, the prophet of a new social order and the creator of history's greatest cataclysm.

The professor returned again and again to see his patient but he was warned never to speak of these professional visits. Gradually, however, the news leaked out. A short time later, a famous German physician traveled by airplanes to Moscow, still the seat of riot, revolt and bloodshed, saw the patient in consultation and made the diagnosis of paresis, a diseased condition of the brain brought on by syphilis.

Thus does Dr. Ralph H. Major, Professor of Internal Medicine at the University of Kansas School of Medicine, reach the climax in his recent book "Disease and Destiny," in which he surveys the influence various diseases have had on the human race, its armies, generals, and potentates, on history, fiction, and on civilization in general. Here in all their awesome aspects are to be encountered the Black Death, or bubonic plague, which brought an end to Athens' Golden Age; the terrible typhus, which struck at Napoleon in Russia; scrofula, or the King's Evil, which cursed the lives of St. Francis of Assisi and Moliere; smallpox, plague of Marcus Aurelius Antoninus and George Washington; and so on through the whole gamut of malignant microbes—the membranous group, malaria and yellow fever, leprosy, hemophilia and last but not least syphilis, which Dr. Major calls the worst plague of all.

Kings, princes, bishops, priests, philosophers, statesmen and prophets have been its victims, he tells us. "It takes place with war, famine, and pestilence as one of the great forces in human history. Beside it rebellion, sedition and private conspiracy fade into insignificance. Plague, yellow fever, leprosy and jail fever (typhus) have all left a deep trace on the course of history but they belong to the past. Syphilis belongs to the past and the present." In 1931, more than 200,000 new cases were reported to the health authorities of the United States. As to how many were unreported, no one will hazard a guess. There are several million people on the American continent suffering from this disease that has been virtually wiped out in Sweden.

The destiny of these millions of Americans suffering from this scourge is for the pens of future historians.

Spain, according to some authorities, was the first country in Europe to be affected by syphilis, because the sailors of Columbus had brought the disease from America.

Diaz de Isla, a physician writing in 1539, asserted that he was in Barcelona when Columbus returned from his memorable voyage, and that he saw and treated some of the sailors who contracted this disease in America. More reliable authorities have agreed that Columbus brought the disease to Europe for the first time. In fact, attempts to prove the existence of syphilis in Europe prior to 1492 have always failed. In any case, all are agreed that the first widespread epidemic of this disease in Europe occurred in 1494.

Many names were proposed for the new plague. The people of Naples called it the French disease, a name which gradually spread over Europe, much to the annoyance of the French nation. A French physician Jacques de Bethencourt, annoyed by this insult to his country, proposed that since the disease was caused by the worship of Venus, it should be called the malady of Venus. His designa-

*DR. CLAUDE WM. CHAMBERLAIN, Assistant Superintendent of Social Hygiene, Division of Communicable Diseases, State Department of Public Health, of Illinois; Radio Talk No. 409, WHFC, June 6, 1936.

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tion found little favor, although the adjective "venereal" derived from Venus came in time to be generally accepted as a term for diseases of this nature. This failed to take account of the fact that thousands contract these diseases innocently.

In England, common designations for the new disease were the "pockes," the "French pockes" or the "big pox"—names in use for centuries. Many called it the disease of St. Job, asserting that Job's boils were none other than sores of this disease. This name failed to take into account that many victims have an unblemished skin and are free from sores.

Finally, Girolamo Fracastro of Verona, in 1530, published his famous poem "Syphilis or the French Disease," describing in verse the tragic adventures of one Syphilis, a shepherd who was guilty of worshiping his king, instead of the Sun God, and who for this act of impiety was stricken with the dread disease. The poem was clever, well written, and, above all, appeared at the psychological moment, for all Europe was discussing the disease, fearing it, praying to be spared its ravages or imploring Heaven to be cured of it. The name of the shepherd Syphilis became the term that is used today.

Dr. Major tells us that the soldiers of Charles VIII carried the disease to France from Italy, but whether it was passed on to them by the Neapolitans or the Spanish soldiers who helped to make up King Charles' polyglot army is open to debate.

With great rapidity this new plague swept across Europe. An astounding laxity of morals pervaded all classes of society in the fifteenth century. Kings, nobles and clergy set the pace and the populace did not lag behind. Prostitution was wide open and some of the women occupied a floor of a school house or some other public building. Public baths, where persons of both sexes bathed in the scantiest of attire or none at all were common and an important factor in spreading the disease.

Erasmus, the distinguished humanist of the following century said: "Five and twenty years ago nothing was so much beloved by the people as the bath house which at the present day remains unheated and empty, for the new skin disease teaches us to refrain from its use." So the ancient habit of bathing was discarded in Europe. In certain countries it has slowly returned; in other countries it has never become popular. However, the syphilis swept on quite unmindful that the baths had been closed.

The German soldiers in the army of Charles VIII made their way back to their native land, carrying the disease with them. At first it seemed to rage mainly among soldiers, vagabonds and strumpets, but it rapidly spread from the lowest ranks of society to the highest. Fair ladies and brave knights, learned and pious monks, bishops, abbots and abbesses, even rulers on their thrones were numbered among its victims.

Dr. Major tells us that Francis I was the first French king to be infected with syphilis, and suffered from it the rest of his life. Modern writers do not seem to have made the most of the private life of Francis I, who was a patron of the arts and who seems to have been influenced by his disease to wars and conquests of women. As he grew older Francis became more and more imperious and autocratic. He squandered public funds on his favorites; massacred his Protestant subjects; boasted that he was the King of his own good pleasure. The progress of this disease formed the battle plans of Charles V, his old enemy, who harassed and defeated him at every turn. He is reputed to have invited Henry VIII to France where his hospitality included the infection of Henry, whose private life has not been ignored by modern writers.

The effect of syphilis on Henry VIII is a matter of popular literature and more or less common knowledge. His children of various wives were either stillborn or died shortly after birth. One daughter alone survived to become "Bloody Queen Mary." Dr. Major tells us that the French disease altered the whole course of English history. "If Henry had never contracted the disease, Catherine's sons would probably have lived, the King would have been abundantly provided with heirs, the divorce and break with Rome (which made England Protestant) might never have occurred. Anne Boleyn and Catherine Howard might have escaped their fate at the block; Sir Thomas More might have died a natural death; Archbishop Cranmer might not have been burned at the stake . . . The history of Ireland might have been a very different story, and even the course of events in America might have been profoundly altered."

Dr. Major tells us of Ulrich von Hutten, little known in America, a victim of syphilis, who was largely responsible for the welding together of the German States, and of the philosopher Friedrich Nietzsche, who, dying of syphilis, set Germany afire with his mad theory of the superman.

His contempt for democracy, his praise of the strong, his slogan of destruction to the weak were held up as the perfect creed of militarism. Thus he is charged with playing a leading role in precipitating the World War.

Silicosis Pneumoconiosis

Its Clinical and Industrial Aspects

SILICOSIS has become one of the major problems of industry throughout the world.* Silica being the most common element of the earth next to oxygen, man has been exposed to its inhalation since the beginning of time. May I be excused if I purloin a common expression of the day when I say the "Greeks had a word for it." Hippocrates himself recognized it, but blamed mining and metal dust for the industrial lung trouble of his countrymen; it is their language which has given us the word "pneumoconiosis." Two thousand years elapsed after its mention by Hippocrates until our next written record of Agricola in his treatise "De re metallica," published in 1556, followed by a description by Paracelsus in 1567. A century later, in 1671, Ramizzini wrote a treatise on the diseases of trade. It was the first publication of its kind in the history of occupational diseases. It made special reference to one of the most ancient of working men's maladies, known as the disease of stone cutters who "oftentimes suck in by inspiration the sharp roughened corners, small splinters and particles that fly off; so that they are usually troubled with a cough and some of them turn asthmatic and consumptive and in dissecting the corpses of such artificers lungs have been struck with little stones. Diemerbroek gives a description of several stone cutters that died asthmatic and were opened by him; in whose lungs he found such pieces of sand that in running the knife through the pulmonary vesicles he thought he was cutting some sandy body.

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* H. M. F. BEHNEMAN, M.D.; read before the Section on Industrial Medicine of the San Francisco County Medical Society, San Francisco, Calif., September 17, 1935; published in *Northwest Med.*, May, 1936.

Ramizzini wrote another book upon the diseases of tradesmen, in 1705. We have eight more historical articles written between that time and 1800. In the next 100 years about 386 articles were published on the subject of pneumoconiosis. The bibliography on this subject now numbers to about 3,000 accepted references.

Silica being the most common element of the earth's crust next to oxygen, it is a common constituent of our food, in the air we breathe, and in the water we drink. It is the oldest source of industrial hazard. Silicosis is a definite disease, intended to become the foremost and most serious of occupational diseases of the future because of the number of workers in the dusty trades is greater than that of any other group exposed to a single industrial hazard. About 16% of all workers are exposed to the hazard of dust. Over 200 occupations give enough dust to produce some effect on the respiratory tract. As much as 10 ounces of dust have been recovered from the lungs of coal miners and often one-third of the entire weight of the lungs has been found to be silica deposits.

The subject is assuming staggering significance. Over a half million people are exposed to silicosis in the United States. While tuberculosis in this country has decreased over 50%, in the dusty trades it has risen over 13 times. Let me quote a few round figures of the distribution of these people exposed to silicosis and other forms of pneumoconiosis: 218,00 in smelting and refining foundries; 62,-000 in metal mining; 30,000 in coal mining; 35,000 in glass works; 27,000 as grinders; 35,000 as buffers; 22,000 in quarrying; 18,000 in pottery; and 20,000 in manufacturing granular, slate and marble products. There are unknown numbers as sand blasters, vitrious enamelers, and those working with abrasive wheels, sandpaper, hones, minerals, tunnels, roads, streets, and on other construction. Kilgore reported its presence in abrasive soap workers several years ago.

The primary cause of silicosis is inhaled free silica (S_iO_2) invisible to the naked eye. Its world wide distribution has resulted from the introduction of pneumatic tools in mines, quarries, tunnels, building and stone work, sand blasting, pottery, foundries, and factories where grinding and enameling go on. In the refinements of industry the particles have become finer and the silica more pure. Men are driven harder, they breath deeper and faster, and the morbidity from silicosis increases. We know that the dust particles, in order to be absorbed into the lung tissues, must be much too small to produce a direct mechanical injury. The effect is chemical, rather than traumatic.

Let us review the symptomatology, and then the important industrial aspects.

SILICOSIS may be divided into two classes; simple silicosis, and silicosis plus tuberculosis (or vice versa).

Simple silicosis is usually further divided for convenience of description as well as compensation into three stages: first, second and third. In Canada and South Africa they are defined by laws as anteprimary, primary and secondary. Examination of nearly 15,000 men in South Africa and in the Pitcher district of Oklahoma revealed no correlation between silicosis and past diseases. The majority of investigators feel that it is not merely a distinct clinical entity, but is a fibrosis started by dust which from its beginning is linked up with an element of latent tuberculosis infection.

Substances which are common constituents of occupational dust may be divided into two groups; active and inert, depending on their behavior when injected subcutaneously. Active dusts are those causing acute inflammatory reactions, such as kaolin and flint. Inert reactions are those causing glandular pathology, such as iron coated silica and wellingtonite. Dust is a common constituent of our food; it is in the air we breathe and in the water we drink. Individual susceptibility seems to play no appreciable part in causing silicosis, but pre-existing pulmonary disease tends to hasten and complicate its onset. No nationality is exempt and all races are susceptible.

Age in itself seems not to be a great factor in the prevalence of the disease, although the greatest percentage of cases amongst the workers seems to be between the ages of 35 and 40. Naturally, these men have worked longer than the younger ones. Any disturbance in the respiratory tract, such as in the sinuses and nose, seem to increase the frequency and severity of silicosis. Syphilis is definitely contributory, resulting in a more rapid development and a distinctly more rapid course. While all races are susceptible, the disease seems to follow the same morbidity curve as does tuberculosis and hues.

Silicosis usually develops slowly, frequently over 10-year periods, but it may show in less than two. Its severity depends upon three factors: the amount of dust in the air (particles per cubic foot of air), the amount of silica in the dust, and the frequency and duration of exposure.

In discussing the symptomatology of the disease, the cardinal symptom is shortness of breath. The cardinal sign is decreased chest expansion. As previously mentioned, this disease is usually divided into three stages, exclusive of complications with tuberculosis. The first stage of silicosis usually finds the worker in robust health; with a normal weight, a normal blood pressure, slight dyspnea or practically none; his working capacity is not noticeably impaired by himself or anyone else. He may have some unproductive cough; it is usually a dry cough, often worse in the morning, and often bad enough to induce vomiting.

Out of 7,722 miners examined in the Pitcher district of Oklahoma, 18% were in the first stage of silicosis. Many of these men showed a decrease in chest expansion; the elasticity of the chest wall was impaired; they were subject to recurrent colds, and there were slight roentgen signs in most of them.

The highest percentage of these 7,722 men were in the second stage of the disease. The symptoms of this stage were, first of all, an increase in the symptoms of the first stage plus the appearance of chest pain, with more expectoration and fairly frequent hemoptysis. They noticed their working power impaired. Vomiting was frequent, as well as recurrent colds. The roentgenogram shows generalized medium-sized mottling throughout both lung fields, usually discreet and well bordered on a background of fibrous arborization. These men in the second stage seemed to show a weight above normal. The upper half of the chest usually shows a flattening, but not a marked retraction as in tuberculosis in a chronic stage. There is definite decrease in respiratory excursion. Inspiration becomes more harsh with expiration fainter and prolonged.

In the third stage of this disease, the dyspnea becomes quite marked and distressing even on little exertion. Cough is harsher and more constant. The expectoration in this stage may be copious, the overweight becomes soon underweight, the pulse rate rises, chest expansion is markedly decreased, and the individual capacity for work becomes seriously or permanently impaired. There may be dilatation of the heart. Cyanosis may be present. Now we have dense roentgen findings. There does not appear to be any supraclavicular or infraclavicular depression. The percussion note becomes flat, and the chest usually has the appearance of emphysema to a greater or lesser degree at some time during the course of the disease. Of these 7,700 miners examined, only 32 were found to be in the third stage.

This important work was done by Sayers of the United States Public Health Service, and confirmed the excellent work of Irvine and his associates in the study of this silicosis problem in South Africa. Of the 7,722 cases in this series, 20.3% were under 20 years of age who developed silicosis; 25% of those having silicosis were between the ages of 40 and 49. Those men found to have first stage silicosis had worked an average of 13 years with exposure to silica. However, those starting to work after 40 years of age only worked 7.8 years on an average before developing the disease.

Sayers regards silicosis as a dust infection linked from its clinical beginning with an element of latent tuberculosis. It has been noted by many capable workers that coal miners, who presumably had anthracosis and later worked in contact with silica, succumbed to silicosis much more rapidly than their fellow workers. Unlike tuberculosis, however, and other diseases, there does not seem to exist any relationship between living conditions and the development of silicosis. It is purely a problem of exposure to silica in dust. It is an insidious disease of extreme importance. It is often difficult to recognize because of its difficulty in diagnosis, its peculiar relationship to tuberculosis, its universal susceptibility and the extreme difficulty associated with efforts for prevention and control.

Of all the dusts, silica is the element producing the most damage, inorganic dust causing more pulmonary disease than organic dust. We must not forget the fact that tuberculosis has decreased markedly in general throughout the world, particularly in this country, but that it has risen alarmingly in the dusty

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trades; 75% of silicosis patients die of tuberculosis. The tuberculous factor may appear in any stage of the disease. A partially healed or latent tuberculosis may be reactivated by exposure to silica. This tuberculosis modifies the roentgen pictures into very confusing problems at times.

Our diagnosis naturally rests upon three bases: the history of exposure, the roentgen picture of the chest, and, least of all, that of physical examination. The silicon fibres are also demonstrable in the sputum of most cases. Silicosis is bound to develop when a sufficient quantity of fine dust is inhaled over a sufficient period of time. The free silica, silicum dioxide, causes this severe fibrosis; asbestos, however, causes a similar picture. Particles one to five microns in size are the most dangerous. Many workers believe that the mottling seen in the roentgenogram is the first sign of the disease, but often there is confusion with military tuberculosis.

Cunningham studied a series of 728 cases, all having simple silicosis in the first stage. At the end of six years, 25% were still in the first stage, 25% were in the third stage, and 18% were dead, mostly from tuberculosis. When silicosis is well established before the advent of tuberculosis the progress is extremely rapid, the patient may be bedridden in a few weeks and dead in a few months. The greater the degree of silicosis the more rapid the tuberculous pathology. One outstanding feature of silicosis throughout the world is the almost unanimous agreement of symptomatology, pathology and prognosis among the major workers.

The four outstanding workers in this country are probably Lanza, of the Metropolitan Life Insurance Company; Gardner of Saranac Lake; Pancoast of the University of Pennsylvania; and R. R. Sayers of the United States Department of Public Health. The most modern and comprehensive books on the subject are those by Geo. G. Davis, Ella M. Salmonsen and Joseph L. Earlywine of Chicago, one published last year and one just off the press. The former is entitled, "The Pneumoconioses (Silicosis); Bibliography and Laws"; the latter, "Literature and Laws." These have an excellent biblography of 2,768 articles, beginning with Agricola's "De re metallica," published in 1556. The publisher is Industrial Medicine, Inc., Chicago.

Summarizing, then, the diagnosis of silicosis, we can say that it can be arrived at with accuracy only by a full consideration of the history, physical findings, ethiology, pathology and chemical examination. We must bear in mind that the silica particle as such is not solely responsible for the causative lesion. In a vast number of cases, sericite, a hydrate of potassium aluminum silicate, is the causative factor of the pulmonary lesion. A good many workers consider asbestos particle inhalation as a form of silicosis. Strictly speaking, however, this naturally should be called asbestosis, and the injury in that disease as in the ordinary silicosis is due again to silicic acid solution. Aside from the asbestos and the sericite, which I mentioned, there is also sillimanite and tremolite, the former being an aluminum silicate compound and the latter calcium magnesium

silicate compound. We also have fibrous forms of free silicate as in chert, or fibrous rock as in pumice.

In this discussion of silicosis symptomatology and sequelae, tuberculosis has received the most prominent attention. I must mention the fact, however, that carcinoma of the lungs and of the bronchi has been fairly frequently reported in scattered areas throughout these industrial fields. Undoubtedly more carcinoma would be found if all these cases came to autopsy. The possibility of this malignancy occurring in the future has been used in the racketeering and legal maneuvers I shall mention later on.

Finally, in making a diagnosis of silicosis, an accurate industrial history, past and present, must be painstakingly investigated and established to have some definite time relationship with the train of events in the clinical course.

The situation in California at the present time is a deplorable one in the sense that a recent decision of the Supreme Court so lengthened the time limit for filing claims that lawyers have combed the state to find suitable cases wherein silicosis disability can be claimed. In this state so far, nearly 100 cases have been filed with the Industrial Accident Commission. The decision of the Supreme Court was that of the Marsh case, which changes the situation to this effect: there is almost no time limit now within which an applicant may file with the commission after the work ended which contributed to his disability. In other words, the court considers that a man is not suffering from an occupational disease until he has definite belief or information that his symptoms are related to the work he was doing. Therefore, a period of years may elapse after a man has worked even a short time subjected to dust inhalation before he files claim. It may be the tenth year after his work that he first discovers that his present disability is related to the work he was doing. From that day on when he is so cognizant of the situation he has six months in which to file.

Organized labor is signing up all of the workers they can find who are or have suffered from respiratory diseases, and do or once did work in the mines or other dusty trades. They are even filing them and determining the facts later. Well over one hundred million dollars worth of damage suits have been filed in this country by silicosis claimants. Recovery has been frequent (in courts especially) and awards have been high.

In southern California the situation is particularly acute because of the number of pottery, clay modelling and asbestos workers. The tuberculous ward in the San Francisco Hospital has discharged men after many months of care, and later, if they are working at a dusty trade, many are claiming a tuberculosis on industrial grounds. One of the most difficult situations to work out is the fact that a great many workers are suffering from some heart condition causing dyspnea and other physical signs but their lungs radiology may show some pathology. The disability here is definitely cardiac, entirely divorced from the word they were doing, yet because of the appearance of some pathology in the lung a fight is being made for these men on the grounds of industrial disability. The cases involving the California State Compensation Insurance Fund are already so numerous that legal talent on the outside has now been engaged to defend the State.

WHAT are we going to do about it? Once silicosis is established in the individual there is little in the way of therapeutics. Once present, the disease advances, often becoming fatal, so that our chief method of attack in its control and eventual lessening is that of prevention. I feel that the first important factor is the forming of compensation laws that will allow and recognize the physical and radiologic examination of men applying for and starting work of this hazard before employment. This allows the rejection of those unfit and gives a warning of those already showing evidence of the disease; then the employer does not assume all the risk in accepting a worker, if he chooses to work, knowing his physical condition.

Next in importance must come the periodic examination of all these workers exposed to free silica. Every state in the Union as quickly as possible should formulate compensation laws covering occupational diseases so that these cases may be kept out of the hands of racketeers and the law courts. Many preventive measures can be carried out at the site where the work is performed, such as the analysis of dust particles in a cubic foot of air, with resulting measures to lessen these, with greater ventilation. As much of this work should be done as is possible under wet conditions, such as wet drilling, wet marble grinding and so forth. Dust should be controlled at its point of generation so as to prevent it from reaching the zone of the workers. Thorough wetting is the simplest solution of this problem.

The air velocity in shafts and tunnels must be increased. In each of the trades in which workers are exposed, a determination should be made of what is a harmful dust measured per million particles of dust per cubic foot of air. There are several methods and apparatus designed and accepted for such analysis. Repeated inspection by men trained in such work should be made of all places in which workers are exposed to dust. All workers having tuberculosis in an active or even latent state should be prohibited from working underground or in dusty occupations above ground. Records must be standardized; methods of examination of the individual as well as methods of inspection of the area of work must be standardized. Only in this way will control measures really amount to something worthwhile. Commissions or boards of medical men, rather than individuals, unless they be specially trained and limited in their activity to this work, should be maintained. It would seem to me a wise thing to have a medical board of appeal to which dissatisfied workers may appear, rather than go directly to the law from the first medical examination. Naturally, each dusty operation or occupation must have its own measures as there can be none applicable to all.

The dust hazard also must be ascertained for each of the dusty trades. For instance, the United States Public Health Service has fixed threshold limits in granite dust. Concentration of granite dust (35% free silica) below 10 million particles per cubic foot, causes no disability or serious lung impairment over a long period of time. This value was taken as a safe limit of dust exposure for workers in this type of granite.

The next type of preventive is the wearing of respirators, but their efficiency will depend upon the type of filter medium used and the way they fit the wearer. Most all workers complain of these protective devices because of their inconvenience, and most of them will only use them intermittently. Compensation boards and accident commissions must base their awards purely on the occupational disability according to the state of the disease.

Several states, notably West Virginia, have provided for silicosis compensation, but classified the disease into three stages and made lump sum awards according to the stage involved. The employer is urged to undertake safety measures in addition to those mentioned, such as their own filter plants for water, bath houses, first aid stations, and easily obtained and low cost medical care with hospitalization when necessary. The whole solution rests more with the sanitary engineers than it does in the field of medicine. All these methods of prevention that I have mentioned have been undertaken in some form by many workers in this field. Naturally they are not original; they are mentioned here to impress you with the tremendous engineering problem that lies ahead.

One recommendation of great merit, suggested to me by Dr. Nelson Howard, is that of the establishment of a medical board of review. This board, consisting of physicians, should have the function of considering each case and deciding whether or not it is an industrial liability case. From their decision, the industrial degree of liability should be decided by laymen constituting the commission. This vast industry needs the highest degree of protection. It needs not only a "new deal" but a new deck.

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